SONY

DIGITAL STILL CAMERA

DSC-D700

SERVICE MANUAL

Vol. 1 (1st Edition)

⚠警告

このマニュアルは，サービス専用です。
お客様が，このマニュアルに記載された設置や保守，点検，修理などを行うと感電や火災，人身事故につながることがあります。
危険をさけるため，サービストレーニングを受けた技術者のみご使用ください。

⚠WARNING

This manual is intended for qualified service personnel only.
To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

⚠WARNUNG

Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.
Alle Wartungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden. Um die Gefahr eines elektrischen Schlages, Feuergefahr und Verletzungen zu vermeiden, sind bei Wartungsarbeiten strikt die Angaben in der Anleitung zu befolgen. Andere als die angegeben Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

⚠AVERTISSEMENT

Ce manual est destiné uniquement aux personnes compétentes en charge de l’entretien. Afin de réduire les risques de décharge électrique, d’incendie ou de blessure n’effectuer que les réparations indiquées dans le mode d’emploi à moins d’être qualifié pour en effectuer d’autres. Pour toute réparation faire appel à une personne compétente uniquement.

CAUTION

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

ADVARSEL

Lithiumbatteri - Eksplosjonsfare.
Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten.
Brukt batteri returneres apparatleverandøren.

Vorsicht!

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.

Ersatz nur durch denselben oder einen vom Hersteller empfohlenen ähnlichen Typ.
Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en likvärdig typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt gällande föreskrifter.

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.

Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

VAROITUS

Paristo voi räjähtää jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

ADVARSEL!

Lithiumbatteri-Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

MANUAL STRUCTURE

Purpose of this manual

This manual is the Service Manual Vol.1 of the digital still camera DSC-D700. This manual contains the operating instructions, service information, electrical alignment and circuit description.

Related manuals

In addition to this Service Manual Vol.1, the following manual is provided.

- **Service Manual Vol.2**
  Part No. 9-977-361-21 (for J, UC, CE)
  Contains the spare parts , circuit diagrams and mounted circuit boards.

- **Service Manual Vol.2 Supplement-1**
  Part No. 9-977-361-81 (for J, UC, CE)
  Contains the semiconductor pin assignments and block diagrams.

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SONY

3-865-496-**12** (1)

Digital Still Camera

Operating Instructions

Before operating the unit, please read this manual thoroughly, and retain it for future reference.

Owner's Record

The model and serial numbers are located on the bottom. Record the serial number in the space provided below. Refer to these numbers whenever you call upon your Sony dealer regarding this product.
Model No. DSC-D700
Serial No. _____

MEMORY STICK

DSC-D700

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SECTION 1
OPERATING INSTRUCTIONS

This section is extracted from operation manual.

WARNING

To prevent fire or shock hazard, do not expose the unit to rain or moisture.
To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

CAUTION
Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

For the customers in the U.S.A.
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
– Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

This device requires shielded interface cable to comply with FCC emission limits.

For the Customers in the U.S.A. and CANADA

DISPOSAL OF LITHIUM ION BATTERY.
LITHIUM ION BATTERY.
DISPOSE OF PROPERLY.
You can return your unwanted lithium ion batteries to your nearest Sony Service Center or Factory Service Center.
Note: In some areas the disposal of lithium ion batteries in household or business trash may be prohibited.
For the Sony Service Center nearest you call 1-800-222-SONY (United States only).
For the SONY Factory Service Center nearest you call 416-499-SONY (Canada only).
Caution: Do not handle damaged or leaking lithium ion batteries.

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Battery Safety Precautions

Follow the safety advice below to avoid leakage, internal heating, fires, explosions or accidental ingestion of batteries.

DANGER (This applies only to battery packs)

- Only charge the battery with the supplied charger.
- Do not put the battery into fire. Do not short it out or dissassemble it. Do not heat in a microwave or conventional oven. If you carry or store the battery with metal objects such as coins or hairpins, shorts may occur.
- Do not recharge or leave the battery pack near fire or under the hot sun.
- If you accidentally get liquid that has leaked from the battery in your eyes, flush with clean water and consult a doctor immediately.

WARNINGS

- Keep the lithium button battery out of the reach of children. In the case of accidental ingestion, consult a doctor immediately.
- Do not put the battery into fire. Do not short it out, disassemble or heat it.
- Use only the specified type of battery.

NOTES

- Be sure the + or - signs are aligned correctly when inserting the battery.
- Remove the battery when it is empty or if the camera is not used for a long time.

If battery leakage occurs, wipe the battery case dry and insert a new battery. If liquid from battery leakage happens to get on your clothes or body, wash well with water.

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

Operation Precautions

Places you should not leave your camera

Do not operate or store your camera in places such as those listed below.
Doing so may lead to the breakdown of your camera.

- **Unusually hot places**
  If left in very hot places such as under the sun or in a car with the windows closed in summer, warping to the body or breakdown may occur.
- **In direct sunlight or near heating equipment**
  Warping or breakdown may occur.
- **Places subject to strong vibrations**
- **Places subject to strong magnetism**
- **Sandy or dusty places**
  When using the camera at the seaside, beaches, or otherwise sandy places, take care to keep the camera free of sand particles. Breakdown which might not be able to be repaired may occur .
- **Don't keep the lens or viewfinder pointed toward the sun.**
  Direct sunlight can harm the internal components of the digital still camera. Take care when leaving the camera outside or in a window.

Operation

- **Don't use in places with strong electromagnetic or radial waves.**
  You won't be able to correctly record or play back.
- **Don't use near TV, AM radio or FM tuners.**
  TV, AM radio or FM tuners will interfere with digital recording.
- **Don't connect the AC power adaptor or battery charger to such devices as electric transformers.**
  Internal heating or breakdown may occur.

Maintenance

If dirty, wipe clean with a soft cloth.

Care of the camera body

- If the camera is very dirty, wipe with a soft coth moistened with a thin solution of neutral detergent. Wipe dry with a cloth.
- Do not use alcohol, thinner or benzine on the unit. Such solvents may remove paint from the cabinet.
- When using a chemically treated cloth, follow the manufacturer's instructions.
- If volatile liquids such as insecticide are left for a long time on the rubber or plastic parts, they may remove paint from the cabinet.

Lens care

Remove dust from the surface of the lens with a blower or soft brush. If the lens is very dirty, wipe with a lens cleaning tissue.

To Maintain the Efficiency of the Camera

Operating and Storage Places

To avoid possible breakdown, do not use or store the camera in the following places:

- Extremely hot or cold places (The operating temperature is 0°C to +40°C (32°F to 104°F))
- In direct sunlight for long periods or near heating equipment
- Humid or dusty places
- Where it is exposed to rain
- Places subject to strong vibrations
- Near sources of strong magnetism
- Near sources of powerful electromagnetic radiation, such as TV or radio transmitters

Heat Emission

Do not wrap the camera in cloth or other materials when operating the camera. Doing so will raise the internal temperature and may cause breakdown.

Transportation

When transporting the camera, pack it in the original carton and packing materials, or similar packaging, to protect it from strong shocks during transportation.

Care

- Use a blower brush to remove dirt or dust from the surface of the lens or viewfinder.
- Lightly wipe the outside surface of the camera with a dry, soft cloth to remove dirt. If the body is very dirty, wipe it with a cloth moistened with a small amount of neutral detergent. Wipe dry with a cloth.
- Volatile liquids such as alcohol, benzine, thinner, or insecticide will damage the surface finish.

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Please Read This

Test Shooting

Before shooting, take a few test shots to make sure pictures are being taken normally.

No Compensation for Picture Content

If a picture is not recorded due to a problem with the digital still camera, the recording content cannot be compensated.

Copyright Laws

Pictures that you take with your digital still camera other than for personal enjoyment cannot be used without permission from the copyright owner in accordance with copyright laws. Be aware that even taking pictures of events like concerts, performances or exhibits for your personal enjoyment may be subject to the same copyright laws.

Power Adaptor

With this unit, use the battery charger BC-V615 (supplied). When connecting to a wall socket, the AC power adaptor/charger AC-V700 is necessary.
The battery pack can also be purchased separately.
To buy one, please check with your nearest Sony dealer.

Battery Pack

Use the InfoLITHIUM battery pack NP-F550 (supplied) or NP-F530. Other battery packs cannot be used. Be sure to charge the battery pack before using for the first time.

Memory Stick and PC Card

Insert Sony Memory Stick MSA-8A (8MB) or MSA-4A (4MB) (not supplied) into Memory Stick/PC Card Adaptor MSAC-PC1 for use with the digital still camera.

The following PC cards may be used in the digital still camera:

- PC cards that conform to PC card standard 6.1
- Flash memory card ATA Type II
- Those with power specifications of 5V or 3.3V/5V

3-volt products cannot be used in the camera. Using incompatible cards in the camera may lead to breakdown.

Camera Playback Data

- Picture data recorded by the camera may be played back on the camera
- Picture data that has been edited on a personal computer or processed may not be played back by the camera even if it is recorded by the camera.

Data Recorded on the PC Card

Picture data is recorded in the following formats:

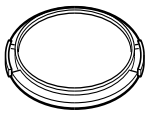
IMJP XXXX (folder name)/MVC XXXXX.jpg (file name)
(When the mode menu quality settings are High, Middle, and Low.)

IMTIXXXX (folder name)/MVCXXXXX.tif (file name)
(When the mode menu quality setting is Super.)

* Picture is only indicated as XXXX/XXXXX on the LCD monitor.

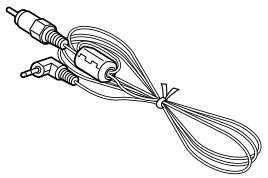
Checking the Supplied Accessories

Before using the camera, make sure you have the following supplied accessories.

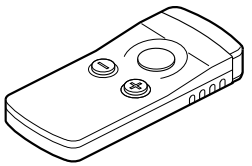


Lens cap (1, fitted on the camera)

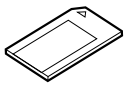
Viewfinder cap (1)



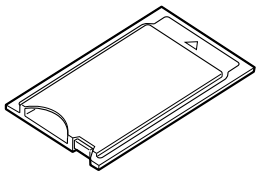
Video cable (1)



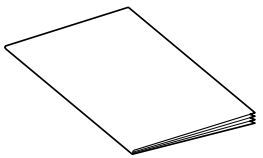
Wireless remote control (1)



Memory Stick (1)



Memory Stick/PC Card Adaptor (1)



User's manual (1)

Rechargeble battery pack	NP-F550 (1)
Battery charger	BC-V615 (1)
Neck strap belt	BLT-10(H) (1)
PC Card/Parallel port Adaptor	MSAC-PR1 (1)

Features

1/2 Inch 1,500,000 Pixel CCD

The digital still camera comes equipped with an all-pixel reading 1/2 inch CCD with 1,500,000 effective picture dots. The unit also uses a primary color filter and 1344 × 1024 pixel high-resolution to reproduce the natural colors and resolution of photographs.

5× Wide Zoom Lens

To make the most of the high-resolution CCD, the camera is equipped with a 5× wide zoom lens for focal distances of 28 mm to 140 mm (equivalent to 35 mm film cameras). Use together with 2× digital zoom to reach the maximum of 10× zoom.
*The resolution changes to 640 × 480 pixels when using digital zoom.

Two Finders: Viewfinder and Large LCD

The camera comes equipped with a viewfinder and a 2.5 inch low-temperature, polysilicon TFT color LCD with CRT contrast, resolution, and response speed.

Precision Speed Auto Focus

With the auto focus function, you can automatically focus on subjects. By pressing the shutter button halfway, you can lock the focus at a fixed position and change the composition before taking the picture.

Four Exposure Modes for Various Picture Taking Conditions

Light meter readings are first output from the CCD and then, depending on the picture taking conditions, one of four modes is chosen: Easy Program Exposure Mode for general picture-taking, Shutter Speed Priority Mode, Aperture Priority Mode and Manual Mode.

Two Frames/Second High Speed Picture Taking with Buffer Memory Loading

Equipped with a continuous picture taking mode, the camera can take 2 frames per second of high-speed picture taking in 640 × 480 size, low mode.

continued on next page

Taking Pictures for a Longer Period with the InfoLITHIUM Battery and Power Saving Option

Using the InfoLITHIUM battery, you can take about two hours of continuous picture taking (with the LCD monitor off.) Also, if the power is on and the camera is not operated for approximately one minute, power to the camera shuts off. If the camera is not operated for about 5 minutes, the whole unit shuts off (Auto Power Off function)

Loading to a Video Output Terminal

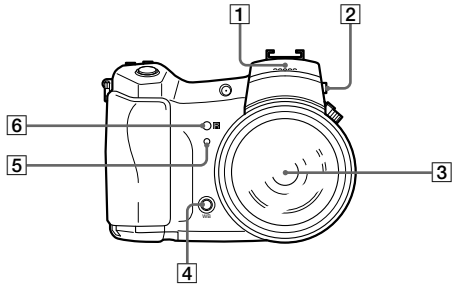
If the unit is connected to a television by the supplied video cable, pictures taken by the digital still camera can easily be played back on the television. This can be a particularly powerful display tool for presentations for meetings and such.

Using the PC Card and Memory Stick

The digital still camera uses the highly reliable PC card (PCMCIA ATA TYPE II) and long-lasting memory stick (for use when inserted in the Memory Stick/PC Card Adaptor) as the image recording medium.

Locations and Functions of Parts

Front



1 Flash
The camera has a built-in Guide Number GN10 flash. To use the flash, press the pop-up key. The cover will open and the flash warms up. The flash is stored when you close the cover.

2 Pop-up Key
Press the pop-up key to open the flash cover.

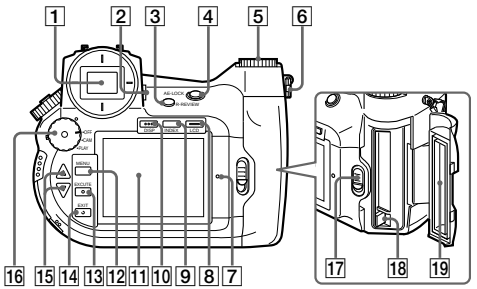
3 5× Zoom Lens
You can manually adjust the zoom lens (28 mm to 140 mm (5×) on a 35 mm film camera) by rotating the zoom ring. After adjusting the zoom, manually adjust the focus with the focus ring.

4 White Balance Button
When HOLD is set in the WB (white balance) mode, white balance can be adjusted by pressing this button.

5 Self-Timer Lamp
When taking a picture with the self-timer, this lamp flashes when the release button is pressed. As the shutter release time draws near, the intervals between flashes become gradually shorter. The shutter is released when the light becomes constant.

6 Remote Control Signal Receiver
Receives infrared signals transmitted by the wireless remote control.

Rear



1 Viewfinder
Lets you frame the picture.

2 Eyesight Adjustment Lever
Adjusts the level of the viewfinder to suit the eyesight of the picture taker.

3 Review Button
Lets you view and play back pictures during the time set in the REVIEW TIME of the custom menu when pressed directly after taking a picture.

4 AE-LOCK Button
The exposure value is locked each time you press the AE lock button.
If the AE-LOCK button is pressed again or the release button is pressed, the lock function is cancelled the next time the camera is used.

5 Shift Dial
Sets the picture quality and size (when the camera is in CAM mode) and changes the pictures that are played back (when the camera is in PLAY mode).

6 Neck Strap Belt Holder
Where the neck strap belt is attached.

Caution

Don't rotate the metal fittings on the holder.

7 Access Lamp
Lights in red when a card is accessed by the camera during picture taking or playback.

Caution

When the access lamp is lit, do not eject the card or turn off the power source. The PC Card or Memory Stick may be damaged.

Note

The PC Card and the Memory Stick installed in the Memory Stick/PC Card Adaptor are both referred to here as CARD.

8 LCD Button
Switches the LCD monitor on and off.

9 INDEX Button
Switches playback to index when pressed while in PLAY mode.

10 DISP (display) Button
Turns LCD monitor information display on or off.

11 LCD Monitor
Lets you read necessary picture taking information, frame shots, and view recorded pictures.

12 MENU Button
Brings up the menu on the LCD monitor to change the settings of the camera or cards.

13 EXECUTE Button
Lets you choose items when adjusting settings in the menu.

14 EXIT Button
Returns you to the previous item or screen when changing settings in the menu.

15 UP▲/DOWN▼ Button
Selects menu items and changes values.

continued on next page

16 Power/Mode Dial

Selects camera conditions when turned while the mode lock (green) is held down.

• OFF

Turns the power off.

• CAM

Allows you to take pictures (CAM mode).

• PLAY

Allows you to play back the pictures you have taken (PLAY mode).

Note

LCD Monitor Display

When the power/mode dial is turned to CAM, the LCD monitor remains off. If necessary, press the LCD button to turn the LCD monitor on.

When the power/mode dial is turned to PLAY, the LCD monitor automatically turns on.

17 Card Cover Lock

Slide this lock to enable card insertion or ejection.

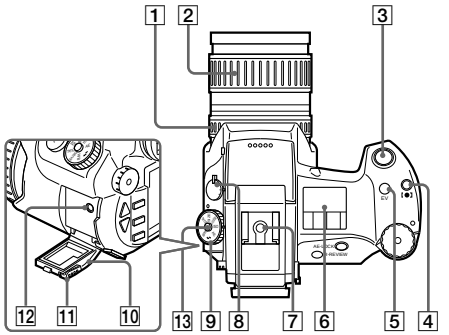
18 Card Eject Button

Press this button to eject cards.

19 Card Cover

Open or close this cover to set the card in place or to eject it.

Top



1 Focus Ring

Rotate left or right to adjust the focus.

2 Zoom Ring

Rotate left or right to adjust the zoom ratio of the zoom lens.

3 Release Button

Operates the shutter when shooting.

4 [●] (Spot Light Meter Reading Switch) Button

By turning the shift dial while pressing this button, you can choose from Spot (○ Spot light meter reading) or Average ([ ]: average light meter reading) to measure the light needed for proper exposure.

5 ⊠ (EV) Button

By turning the shift dial while pressing this button, you can correct the exposure when taking pictures.

6 LCD Panel

Picture taking settings, such as shutter speed and aperture, are displayed on the LCD panel.

7 Hot Shoe

Attach external flashes here.

8 Focus Mode Switch

Switches from auto to manual when the camera is in auto focus mode.

continued on next page

9 Mode Dial
Pressing the shift button (top button) after it has been adjusted to the desired position sets the picture size and quality (in CAM mode) and changes the picture to be played back (in PLAY mode).

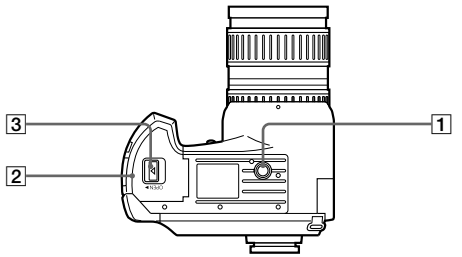
10 Connector Cover
To view pictures on a television, open this cover and connect the video cable (supplied) to the video output terminal.

11 Connector Cover Lock
Slide this lock to open the connector cover.

12 Video Output Terminal
To view pictures on the television, connect the video cable (supplied) here.

13 Shift Button
Pressing this button after moving the mode dial to its desired position sets the picture quality or picture size (in CAM mode) or changes the picture to be played back (in PLAY mode).

Bottom



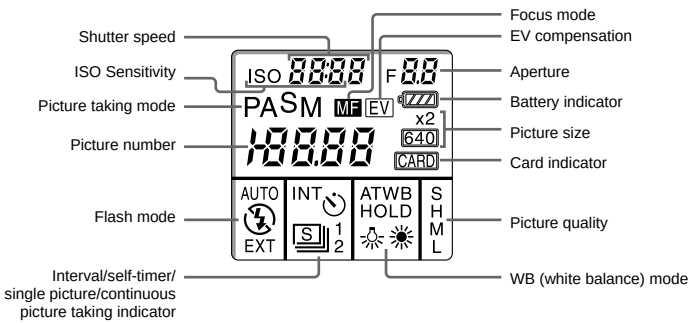
1 Tripod Hole
Attach a tripod here. Standards are as listed below.
ISO Standard *l*=4.5mm +/- 0.2mm
ASA Standard *l*=0.197 inch

2 Battery Cover
Open or close this cover to insert or take out the battery pack.

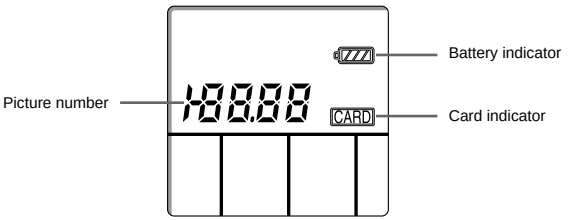
3 Battery Cover Lock
Slide this lock to insert or take out the battery pack.

LCD Panel

CAM Mode



PLAY Mode

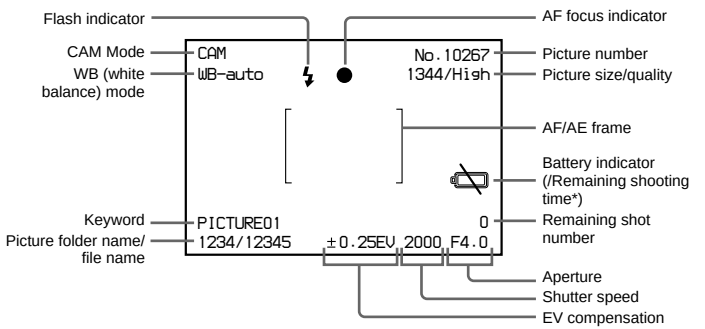


Note

In CAM mode, when the release button is pressed while pressing the shift button, the shutter speed indicator changes to the remaining shot number indicator and the aperture indicator changes to remaining shooting time.
Because the remaining shooting time is only displayed in two spaces, any time over 99 minutes is displayed as 99.
The viewfinder display is changed in the same way.

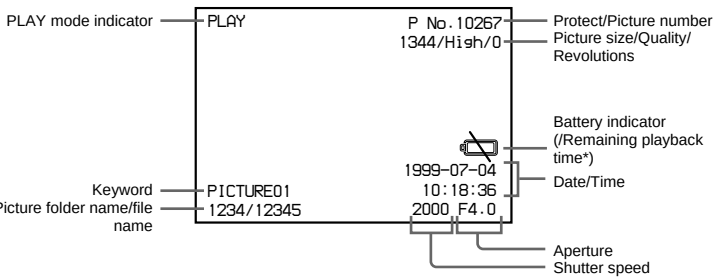
LCD Monitor

CAM mode



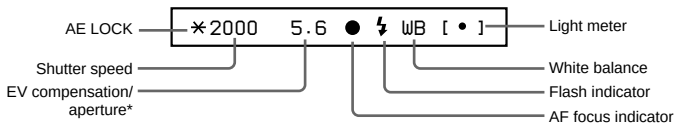
* Remaining shooting time is not displayed when using AC power adaptor/charger AC-V700. Usually the remaining shooting time is displayed. When the battery gets weak, the battery indicator flashes.

PLAY Mode



* Usually remaining playback time is displayed. When the battery gets weak, the battery indicator flashes.
The remaining playback time is not displayed when using AC power adaptor/charger AC-V700.

Viewfinder



* The EV compensation is displayed when EV Button is pressed.

Preparations

Charging the Battery Pack

Charge the battery pack with the battery charger BC-V615 (supplied).
Charge the battery pack before using the camera for the first time.
Charge the battery when necessary, as indicated by the remaining shooting time on the LCD monitor or the battery indicator on the LCD panel.

Battery Pack Charging Time

When it is time to charge the battery, the battery indicator on the LCD panel flashes. For further reference see “Warning Indicators” (page 109).

Battery Pack Charging Time

Battery Charger	Charging time for practical use*	Time for full charge
BC-V615	Approx. 180 minutes	Approx. 240 minutes
AC-V700	Approx. 55 minutes	Approx. 115 minutes

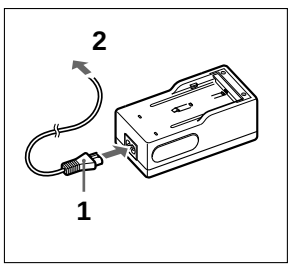
* The time needed for charging an empty NP-F550 battery pack.

Continuous Use with the Battery Pack

The usage time with a fully charged battery:

Battery Pack	Shooting time*		Playback time	
	LCD monitor off	LCD monitor on	LCD monitor off	LCD monitor on
NP-F550	Approx. 2.5 hours	Approx. 1.5 hours	Approx. 5 hours	Approx. 2.5 hours

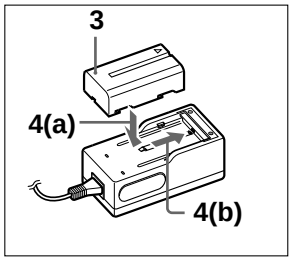
* Times shown are standard values for continuous general photography at 20˚C (68˚F) with the flash off. The time is reduced by repeatedly turning the power on and off.



1 Connect the AC power cable to the battery charger.

2 Plug the AC plug of the AC power cable into a wall socket.

continued on next page



3 Making sure the ▲ mark is pointed in the right direction, place the battery pack in the hollow of the battery charger.

4 Pushing the battery pack down (a), slide it fully into the charger (b).

When charging starts, the charging lamp lights in amber. When charging is complete, the light goes out.

5 After charging has finished, remove the battery pack.

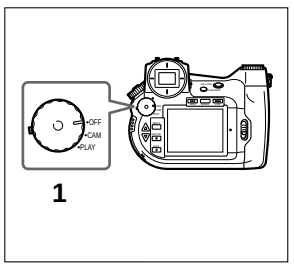
This camera can only use InfoLITHIUM™ batteries.

The InfoLITHIUM battery is a new type of lithium ion battery that transmits data on its condition to InfoLITHIUM-compatible equipment. The digital still camera supports the InfoLITHIUM battery. The InfoLITHIUM battery is recognized by the InfoLITHIUM mark.

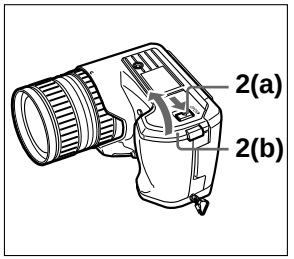
*InfoLITHIUM™ is a trademark of the Sony Corporation.

Installation of the Battery Pack

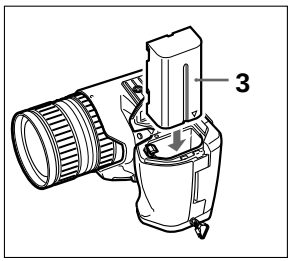
After charging the battery, install it in the camera.



1 Make sure the camera power/mode dial is set to the OFF position.



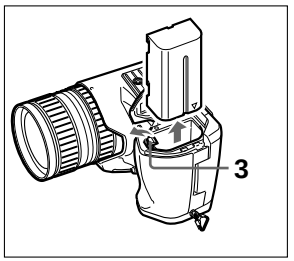
2 Slide the battery cover lock in the direction of the ▲ mark (a), and open the battery cover (b).



3 Insert the battery ▲ mark side first until it firmly locks in place.

4 Close the battery cover.

Removing the Battery



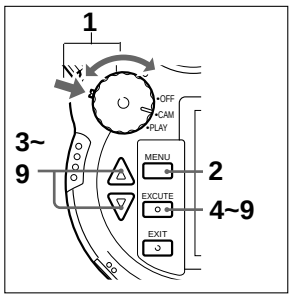
1 Make sure the camera power/mode dial is set to the OFF position.

2 Slide the battery cover lock in the direction of the ▲ mark and open the battery cover.

3 Rotate the battery cover lock to the outside and remove the battery pack.

Setting the Time and Date

The shooting time and date are recorded automatically with information from the camera's internal clock. Set the clock to ensure the correct time and date are recorded.



1 While pressing the mode lock (green), turn the power/mode dial to CAM mode.

2 Press the MENU button.

The LCD monitor turns on and the menu is displayed.

3 Press the ▲(UP)/▼(DOWN) buttons to select "Date & Time".

```
CAMERA MENU

    Custom
    PC Card INIT
    User File Save
    New Folder
    ID Set
    WB Flash
    Date & Time
    Display Set
```

4 Press the EXECUTE button.

The DATE & TIME menu is displayed.

5 Select "Set" using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

The year can now be set.

```
DATE & TIME


Set          1999-07-04 20:45:58
Date Form    yyyy-mm-dd
```


6 Set the year using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

The month can now be set.

7 Set the month, day, hour, minutes and seconds in the same way as explained in step 5.

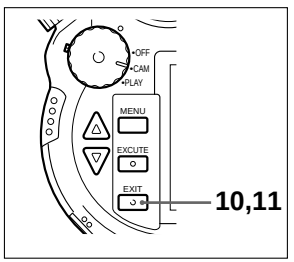
8 Select "Date Form" using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

You can now select the date display format.

9 Select the date display format using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

You can choose from the following 3 date display formats. [yyyy] indicates year, [mm] indicates month and [dd] indicates day.

yyyy-mm-dd (ex:1999-07-04)
dd-mm-yyyy (ex:04-07-1999)
mm-dd-yyyy (ex:07-04-1999)



10 Press the EXIT button.

The time and date are set and the menu returns on the LCD monitor.

11 Press the EXIT button.

The menu disappears from the monitor.

Keeping correct time

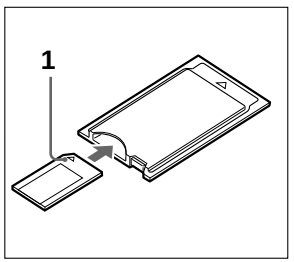
A separate lithium button battery is used by the camera to power the internal clock. When turning the power dial to CAM or PLAY from OFF, if the message "Date & Time not set" appears, it is time to charge the lithium button battery.

Inquire about charging the battery at the store where you bought the camera or at any Sony service center.

Preparing the Card

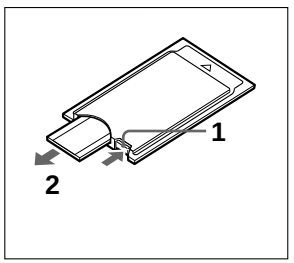
The picture is saved on the PC Card inserted in the camera (not supplied) or on the Memory Stick. Insert the Memory Stick in the Memory Stick/PC Card Adaptor and then insert the adaptor into the camera.
In this guide the Memory Stick, when inserted in the Memory Stick/PC Card Adaptor, and the PC Card are referred to as Card.

Inserting the Memory Stick in the Memory Stick/PC Card Adaptor



1 Making sure the side of the Memory Stick with the ▲ mark is facing up, insert it into the Memory Stick/PC Card Adaptor until it is locked firmly in place.

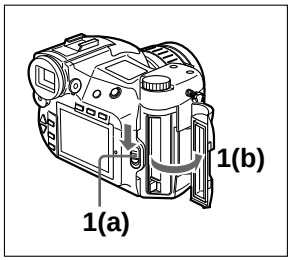
To Take out the Memory Stick from the Memory Stick/PC Card Adaptor



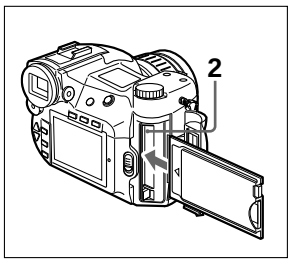
1 Push the EJECT button on the Memory Stick/PC Card Adaptor.

2 Pull out the Memory Stick.

Inserting the Card



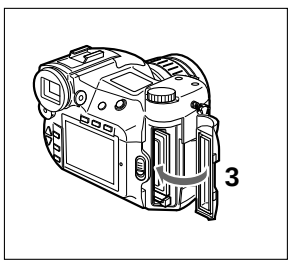
1 Slide the card cover bar lock downward (a) and open the card cover (b).



2 Insert the card in the camera.

Caution

Make sure to insert the card in the proper direction. Forcing the card may result in damage to the camera and/or the card.
If you insert a card that has never been initialized, FORMAT ERROR flashes on the LCD monitor. Initialize the card. (Page 30)



3 Close the card cover.

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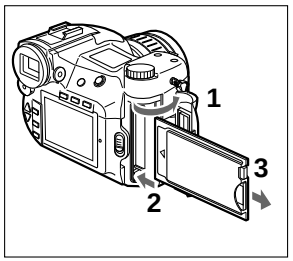
To Remove the Card



1 Open the card cover.

2 Push the card eject button.

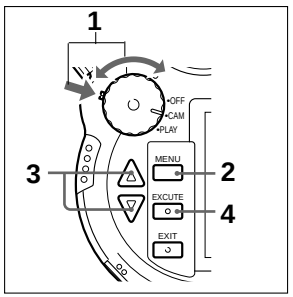
3 Pull out the card.

Initializing a Card

Uninitialized PC cards cannot be used in the camera. Before use, cards must first be initialized using the camera.

Caution

If you initialize a card that has data recorded on it, all recorded data, including protected picture data, will be erased.



1 While pressing the mode lock (green), turn the power/mode dial to CAM mode.

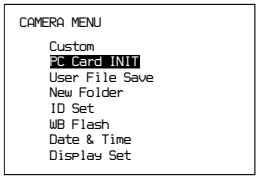
Note

Initializing PC cards is explained here with the power source/mode dial set to CAM mode, but the same operation can be performed in PLAY mode.

2 Press the MENU button.

The LCD monitor turns on and the menu is displayed.

3 Select “PC Card INIT” using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.



The message “Initialize OK?” appears.

4 Press the EXECUTE button.

Initialization begins.

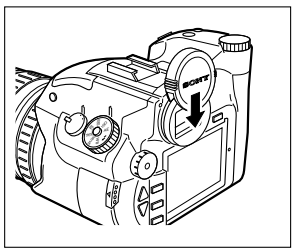
When initialization is complete, the LCD monitor returns to the normal display (as shown in step 1).

Caution

Do not take out the card during initialization. Initialization cannot proceed normally.

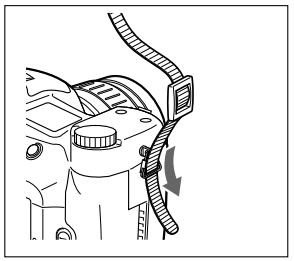
Attaching the Viewfinder Cap

Place the cap on the viewfinder when taking pictures with the LCD monitor under strong sunlight, such as outdoors. Keeping the cap on the viewfinder prevents strong rays of light from affecting the recorded pictures.

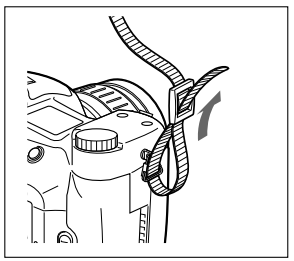


Attaching the Neck Strap Belt

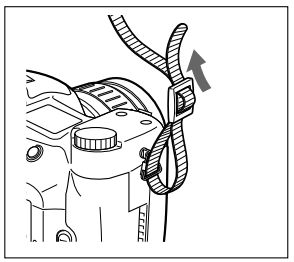
Attach the neck strap belt BLT-10(H) (supplied) to the camera for ease of carrying.

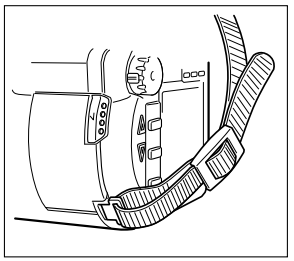


1 Pull the belt through the neck strap belt holder on the camera.



2 Pull the belt as shown in the diagram to adjust the length.





3 Attach the belt on the opposite side of the camera in the same way.

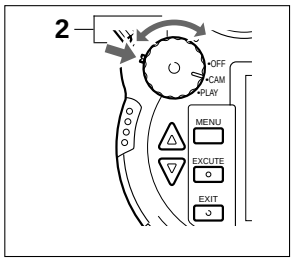
Putting the Camera in a Semi-Soft Case

Put the camera in semi-soft case LCM-D700 (not supplied) for convenience and ease of carrying.

Taking a Picture

Taking Pictures

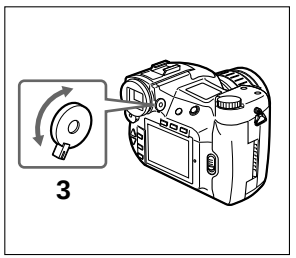
Taking pictures is easy with automatic focus.
In this manual, taking pictures while looking through the viewfinder is explained, but you can take pictures while looking through either the viewfinder or the LCD monitor.



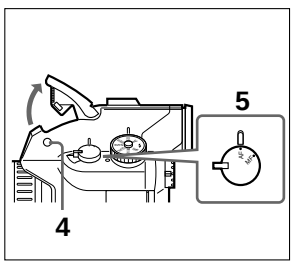
1 Take off the lens cap.

2 While pressing down the mode lock (green), turn the power/mode dial to CAM mode.

The indicators in the viewfinder turn on.



3 Turn the eyesight adjustment lever to where you can clearly see the circle in the center of the viewfinder.

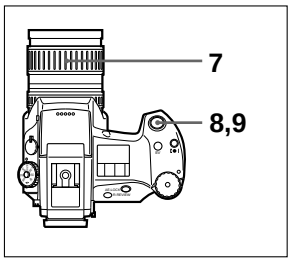


4 If there is insufficient light to shoot the subject (shutter speed or F-stop flashes), press the pop-up key to open the flash.

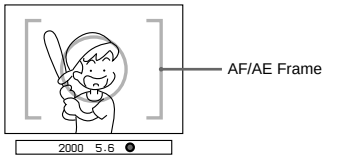
In conditions where it is necessary to use the flash, the flash indicator blinks, and flash preparation begins.

The flash indicator lights when the flash is ready for use.

5 Set the focus mode switch to AF.



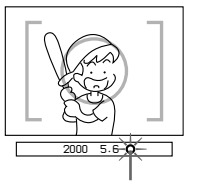
6 Center the subject on which you'd like to focus in the AF/AE frame.



7 Adjust the zoom by rotating the zoom ring left or right.

8 Press the release button halfway.

The AF LOCK indicator in the viewfinder flashes. When the subject is focused, the indicator stays lit.



9 Press the release button completely.

When the access lamp lights, the picture is being recorded on the card.

When the access lamp goes out, recording on the card is completed and the camera is ready to take the next picture.

Caution

When the access lamp is lit, do not remove the card or turn off the power. You may damage the PC Card or Memory Stick.

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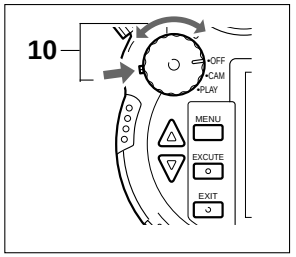


10 Turning the power/mode dial to OFF turns the power off.

Note

If you do not operate the camera for about one minute when the camera is on in the CAM mode, the LCD monitor automatically shuts off (Standby Mode).
Also, if the camera is not touched for approximately four minutes after that, the camera automatically shuts completely off.

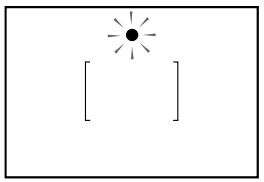
Auto Focus

This camera employs an auto focus mechanism. When auto focus is turned on, the camera automatically focuses on the picture subject. Auto focus is turned on by setting the focus mode switch to AF. Centering the AF frame on the subject and pressing the release button halfway focuses the picture frame.

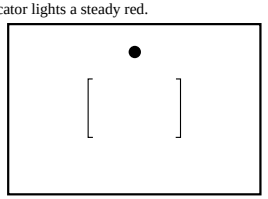
When the picture is in focus, the AF focusing mark in the LCD monitor and viewfinder changes as follows. Check the mark before making the exposure, and if the picture is not in focus, let go of the release button and press it halfway again to refocus.

• On the LCD monitor

When the release button is pressed halfway, the AF focusing mark flashes green.

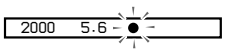


When the picture is focused, the indicator lights a steady green. If the picture cannot be focused, the indicator lights a steady red.

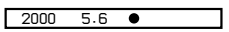


• In the viewfinder

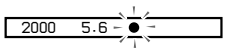
When the release button is pressed halfway, the AF focusing mark flashes.



When the picture is focused, the indicator lights steadily.

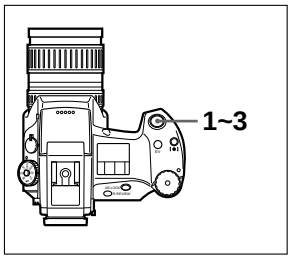


When the picture cannot be focused, the indicator continues flashing.



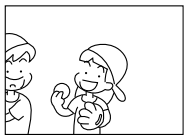
Locking the Focus

When you focus the picture by pressing the release button halfway, the focus is set at that distance until you release the button. This is called Focus Lock. If you want to take a picture of a subject on the edge of the picture composition, engaging Focus Lock allows you to move the camera and then take the picture.



1 Center the subject in the viewfinder and press the release button halfway.

The focus is fixed.



2 Move the camera to frame the composition you want.

3 Press the release button down completely.

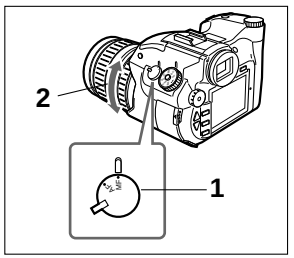
Note

AE-LOCK

When you press the release button halfway to set the focus, the exposure value is also set. This is indicated by the AE-LOCK indicator ✳ in the viewfinder and by highlighted display of the exposure value and shutter speed on the LCD monitor.
Also, if you frame a subject that you'd like to manually set the exposure for and press the AE-LOCK button, the exposure for that subject is fixed.
Use this function when it is necessary to change the picture composition after deciding the exposure. This is effective for picture taking under such conditions as where there is backlight.
To cancel AE-Lock, press the AE-LOCK button again, or press any other operation button.

Setting the Focus Manually

You can set the focus manually with this camera.
There are situations in which it is better to set the focus manually than use the auto focus function.



1 Set the auto focus mode switch to MF.

2 Adjust the focus by turning the focus ring left or right.

Notes

- The focus ring can be rotated completely in either direction.
- Set the focus after adjusting the zoom. If you set the appropriate zoom distance first, you can get a more accurate focus.

Situations in which auto focus may not work well

- When there is a very bright object near the subject;
- When the subject is near a highly reflected surface such as mirrors or polished metals;
- For subjects with non-reflective surfaces such as a black sweater;
- On subjects with small surface areas such as wire netting or lattices;
- On subjects with ephemeral shapes, such as smoke, flames or fireworks;
- On subjects with extremely low contrast;
- On subjects without vertical lines such as Venetian blinds;
- When the subject is moving fast.

Situations in which it is better to focus manually

- When the subject and its surroundings are both dark;
- When the subject offers little contrast on the screen, such as with walls or the sky;
- When the background is too bright or the contrast between the background and the subject is too great;
- When the subject has a fine, repeating pattern such as stripes;
- When the subject is behind a window that is dirty or wet;
- When there is a wire fence in front of the subject;
- When the subject is bright, emits or reflects light;
- When you want to take pictures of still subjects with a tripod.

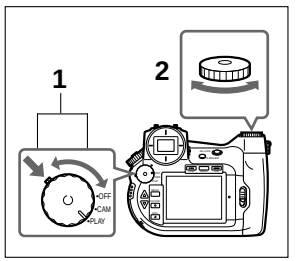
Viewing

Checking the Picture Content

Below are the different ways for playing back recorded pictures.

- **Viewing pictures in succession**
  Pictures are played back one by one in sequence.
- **Viewing pictures in an automatic cycle**
  Pictures are automatically played back in a cycle.
- **Viewing the picture index**
  Pictures are displayed all at once. This is a convenient way to search for a specific picture.

Viewing Pictures in Succession

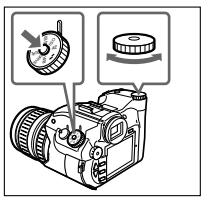


1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The access lamp lights and the camera reads the last picture taken.
When the access lamp goes out, reading is finished, and the picture is played back.

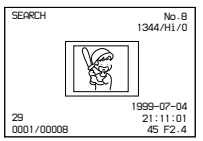
2 Rotate the shift dial to change the picture.

Turning the wheel right plays back the next picture; turning the wheel left plays back the previous picture.



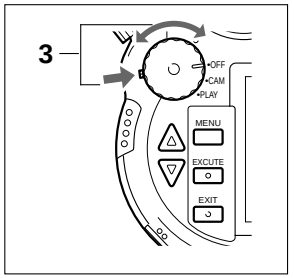
Note

While pressing down the shift button, turn the shift dial to choose which picture to play back. When you release the shift button, the picture you have chosen plays back immediately. (Picture Search).



In Picture Search, when you rotate the shift dial while holding down both the shift button and the release button, you can skip 50 pictures at a time.

continued on next page



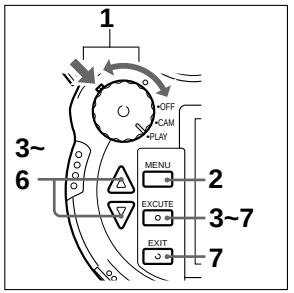
3 Turn the power/mode dial to OFF to turn off the power.

Note

If the camera is on but not operated for about three minutes, power to the LCD monitor shuts off (Standby Mode). Also, if the camera is not operated for approximately another two minutes, the camera shuts off completely. In Standby Mode you can return to the playback condition by touching any button, dial or switch on the camera. When the camera has shut itself completely off, you can return to the playback condition by pressing the release button.

Viewing Pictures in an Automatic Cycle

Pictures are automatically played back frame by frame.



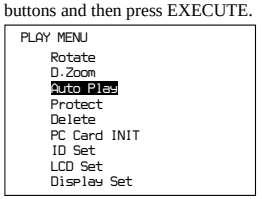
1 While pressing the mode lock (green), rotate the power/mode dial to PLAY.

The access lamp lights as the camera reads the last picture taken.
Reading is finished when the access lamp goes out. The picture is played back.

2 Press the MENU button.

The menu is displayed on the LCD monitor.

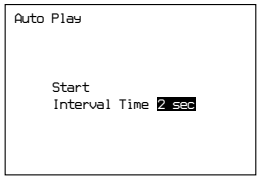
3 Select “Auto Play” using the ▲(UP)/▼(DOWN) buttons and then press EXECUTE.



The Auto Play menu is displayed.

4 Select “Interval Time” using the ▲(UP)/▼(DOWN) buttons and then press EXECUTE.

You can now set the number of seconds to display one picture.



5 Select the display interval time using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

Note

You can set the interval time between the range of 1 to 30 seconds (in 1 second units). However, depending on the playback quality and size, the set time might be overridden.

6 Select “Start” using the ▲(UP)/▼(DOWN) buttons and then press EXECUTE.

The pictures are automatically cycled for the period of time you set.
When all the recorded pictures have been played back, playback is repeated from the first picture.

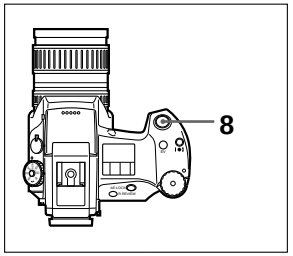
7 To pause playback, press the EXECUTE button.

Playback momentarily stops. To cancel the pause function, press the EXECUTE button again.

Note

When you press EXIT while in pause, playback stops in mid-sequence and the LCD monitor returns to the Auto Play menu.
To restart playback, press the EXECUTE button again.

continued on next page



8 To end automatic playback, press the release button halfway.

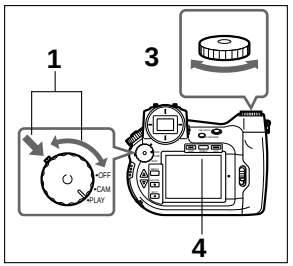
Automatic playback ends and the image appearing when you pressed the release button is displayed.

9 Turn the power/mode dial to OFF to turn the camera off.

Note

When the camera is set to automatic playback, the Auto Power Off function does not work.

Viewing the Picture Index



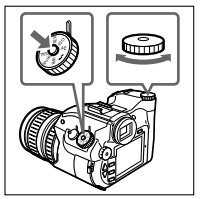
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The access lamp lights and the camera reads the last recorded picture.

Reading is finished when the access lamp goes out, and the picture is played back.

2 Press the INDEX button.

The LCD monitor display switches to index view.



3 Rotate the shift dial to select a picture.

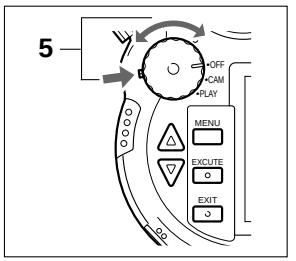
The color of the picture you have chosen changes and information about that picture, such as date and exposure, is displayed.

Note

In Index Mode, when you rotate the shift dial while holding down the shift button, you can jump ten frames to choose a picture.
When you rotate the shift dial while holding down the shift button and the release button simultaneously, you can jump 50 frames to choose a picture.

4 To close index view, press the INDEX button again.

The pictures that you selected are played back one at a time.



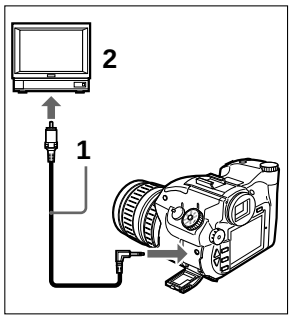
5 Turn the power/mode dial to OFF to turn the power off.

Note

If the camera is on but not operated for about three minutes, the LCD monitor shuts off (Standby Mode). Also, if the camera is not operated for approximately another two minutes, the camera shuts off completely. In Standby Mode you can return to the playback condition by touching any button, dial or switch on the camera. When the camera has shut itself completely off, you can return to the playback condition by pressing the release button.

Viewing Pictures on a Television

You can view pictures taken with the digital still camera on a television when it is connected to the TV's video terminal. This is convenient for adjusting the focus and viewing pictures in succession.



1 Use the video cable (supplied) to connect the camera video output terminal to the television video terminal.

Note

It is not possible to connect to a television that only has an antenna input terminal.

2 Set the television TV/video switch to VIDEO.

3 Play back the pictures through the camera.

Note

You can turn the LCD monitor display off by pressing the LCD button.

Using a PC Card Reader

When you connect a PC card reader on your computer and install the driver, the card is recognized as a drive. In this way, you can manage pictures saved on the card as computer files.
For further details on the PC card reader or driver, please refer to the PC card reader user's manual.
For further details about managing pictures on your computer, please see the user's manual for the picture processing application or the application's help function.

Using the PC Card/Parallel Port Adaptor

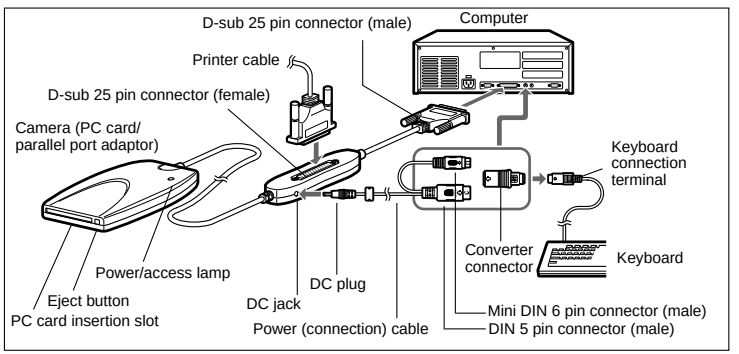
When you connect the MSAC-PR1 PC card/parallel port adaptor on your computer and install the MSAC-PR1 device driver, the card is recognized as a drive. In this way, you can manage pictures saved on the card as computer files.
The methods of connecting the PC card/parallel port adaptor to the computer and installing the PC card/parallel port adaptor driver are explained in this guide.
For further details about managing pictures on your computer, please see the user's manual for the picture processing application or the application's help function.

Connecting the PC Card/Parallel Port Adaptor

The PC card/parallel port adaptor connects to the parallel port connection terminal used by the computer keyboard.
Be sure the computer is turned off when you connect the adaptor.

Note

The PC card/parallel port adaptor uses energy supplied by the computer keyboard connection terminal. In some cases, insufficient energy is supplied by laptop computers. In such cases, use the PC card slot on your laptop computer.



- Of the 2 DIN terminals, connect to the one that serves as the computer keyboard connection terminal.
- Between the camera and the keyboard, adjust the size of the DIN connector of the keyboard and the power cable using a converter connector.
- There is no need to connect to the keyboard with laptop computers.
- If a printer will not be used, there is no need to connect the printer cable.

continued on next page

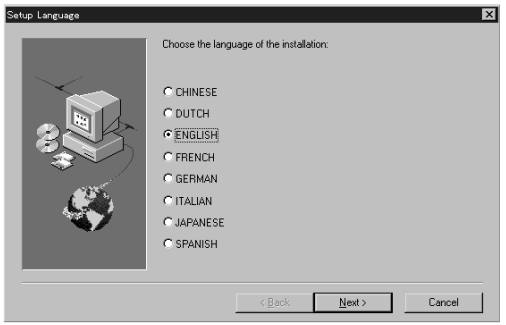
Installing the Driver

1 Insert the supplied CD-ROM into the CD-ROM drive.

The “Sony MSAC-PR1 Setup” dialog box appears.

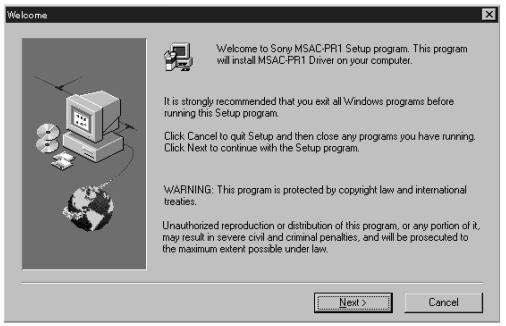
2 Click “Install Sony MSAC-PR1 Drivers”.

The “Setup Language” dialog box appears.



3 Select a language and click [Next].

The “Welcome” dialog box appears.

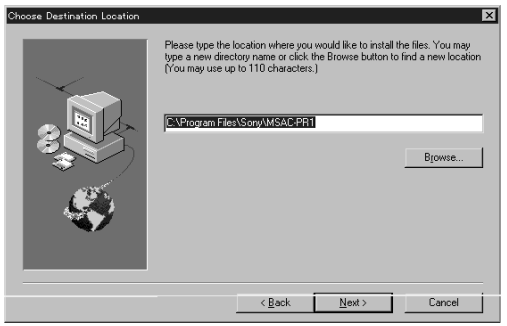

Welcome
Welcome to Sony MSAC-PR1 Setup program. This program will install MSAC-PR1 Driver on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Next >
Cancel

4 Click [Next].

The “Software License Agreement” dialog box appears.

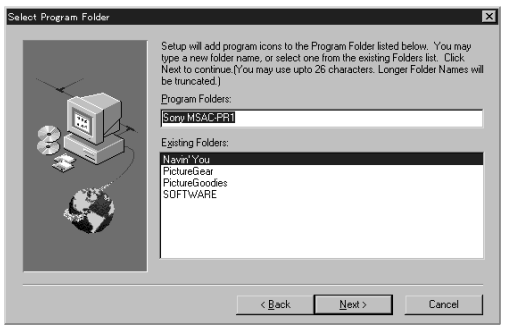
5 After reading and agreeing with the terms of the Software License Agreement, Click [Yes].

The “Choose Destination Location” dialog box appears.


Choose Destination Location
Please type the location where you would like to install the files. You may type a new directory name or click the Browse button to find a new location (You may use up to 110 characters.)
C:\Program Files\Sony\MSAC-PR1
Browse...
< Back
Next >
Cancel

6 Specify a destination folder for installation and click [Next].

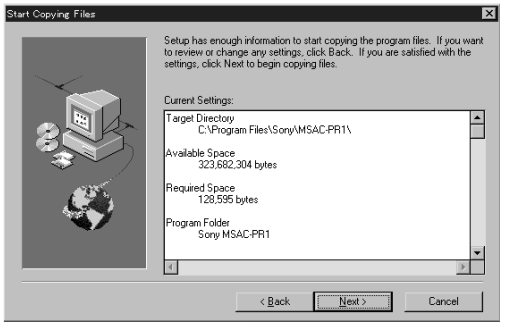
The “Select Program Folder” dialog box appears.


Select Program Folder
Setup will add program icons to the Program Folder listed below. You may type a new folder name, or select one from the existing Folders list. Click Next to continue.(You may use upto 26 characters. Longer Folder Names will be truncated.)
Program Folders:
Sony MSAC-PR1
Existing Folders:
Navin' You
PictureGear
PictureGoodies
SOFTWARE
< Back
Next >
Cancel

continued on next page

7 Specify a program folder name and click [Next].

The “Start Copying Files” dialog box appears.

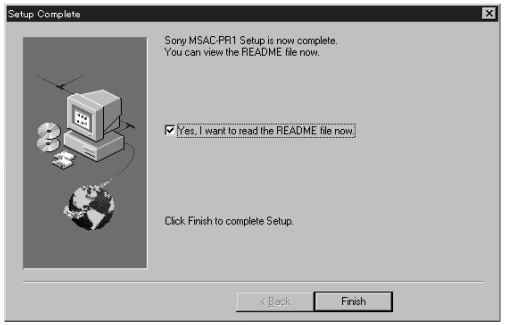

Start Copying Files
Setup has enough information to start copying the program files. If you want to review or change any settings, click Back. If you are satisfied with the settings, click Next to begin copying files.
Current Settings:
Target Directory
C:\Program Files\Sony\MSAC-PR1\
Available Space
323,682,304 bytes
Required Space
128,595 bytes
Program Folder
Sony MSAC-PR1
< Back
Next >
Cancel

8 Confirm the displayed installation settings and click [Next].

Installation starts and the “Sony MSAC-PR1 Drive Identification” dialog box appears.

9 Confirm the drive name of the PC card/parallel port adaptor and click [OK].

The “Setup Complete” dialog box appears.


Setup Complete
Sony MSAC-PR1 Setup is now complete.
You can view the README file now.
Yes, I want to read the README file now.
Click Finish to complete Setup.
< Back
Finish

10 Click [Finish].

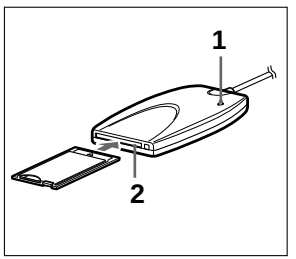
In step 9, if the “Yes, I want to read the README file now” box is checked, the README document is displayed. Installation is complete.

Inserting the Card

When you insert the card into the PC Card/Parallel port Adaptor, the drive that was specified as the drive name in step 8 of the "Install Driver" directions (page 48) is recognized. You can now manage the card contents on your computer.

Note

When using the Memory Stick, insert the Memory Stick into the Memory Stick/PC Card Adaptor.



1 Make sure the power/access lamp is not flashing.

Caution

If you insert the card when the power/access lamp is flashing, you may damage the PC Card or Memory Stick.

2 Make sure the ▲ mark is facing up and slowly slide the card into the card insertion slot.

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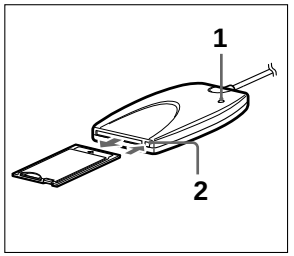
Taking Out the Card



1 Make sure the power/access lamp is not flashing.

Caution

Do not take out the card when the power/ access lamp is flashing. Doing so may result in damage to your PC Card or Memory Stick.

2 Press the eject button and slowly pull out the card.

Uninstalling the Driver

If the MSAC-PR1 device driver is no longer necessary, you may remove it from your computer using the steps below.

1 Click [Start] in the task bar, and then open [Program] from the [Start] menu and click on [Sony MSAC-PR1]-[Uninstall].

The uninstall confirmation dialog box is displayed.

2 Click [Yes].

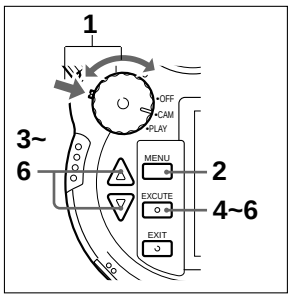
The uninstall program starts. The dialog box “Remove Programs From Your Computer” is displayed and file erasure begins.

3 When uninstallation is complete, click [OK].

Advanced Operations Settings

Choosing the Shooting Mode

Choose the shooting mode from the choices Program AE (Program), Aperture Priority AE (Aperture), Shutter Speed Priority AE (Shutter) or Manual Exposure (Manual).



1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the LCD button to turn the LCD monitor ON.

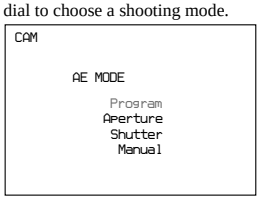
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to AE and press the shift button.

The shooting mode menu is displayed.

4 While pressing the shift button, rotate the shift dial to choose a shooting mode.



Program (Program AE)

In this mode, the aperture and shutter speed are both changed simultaneously according to the brightness of the subject. The correct exposure is automatically chosen.

Aperture (Aperture Priority AE)

When the aperture is fixed, the shutter speed is automatically changed according to the brightness of the subject to obtain the correct exposure.

continued on next page

Shutter (Shutter Speed Priority AE)

When the shutter speed is fixed, the aperture is automatically changed according to the brightness of the subject to obtain the correct exposure.

Manual (Manual Exposure)

You can decide the exposure by setting the shutter speed and aperture manually.

Note

Shooting modes are indicated on the LCD panel as P (Program AE), A (Aperture priority AE), S (Shutter Speed priority AE), and M (Manual Exposure).

5 Release the shift button.

When the shooting mode is set, exit the menu. The camera is ready to take pictures.

Note

After deciding the shooting mode, select the shutter speed and/or aperture as explained below.

Program AE

Turn the shift dial to choose a fixed shutter speed and aperture combination.

Aperture Priority AE

Turn the shift dial to the desired aperture.

Shutter Speed Priority AE

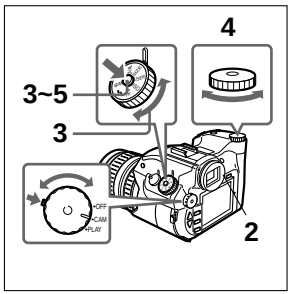
Turn the shift dial to the desired shutter speed.

Manual Exposure

Turn the shift dial to choose the shutter speed. While pressing the ± button, turn the shift dial to choose the aperture.

Choosing Picture Size

Choose the picture size to be recorded during shooting from among the following: 1344 × 1024, 640 × 480, ×2D. Zoom. The larger the size, the fewer the number of pictures that can be recorded.



1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the LCD button to turn the LCD monitor ON.

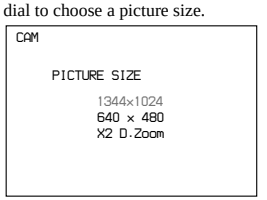
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to SIZE and press the shift button.

The PICTURE SIZE menu is displayed.

4 While pressing the shift button, rotate the shift dial to choose a picture size.



1344 x 1024

Records pictures in 1344 × 1024 pixel format.

640 x 480

Records pictures in 640 × 480 pixel format.

x2 D. Zoom

The mode for shooting pictures at 2× the virtual focal distance (about 56 to 280mm for 35mm film cameras). Pictures shot with ×2D. Zoom are recorded in 640 × 480 pixel format.

continued on next page

Because the picture frame narrows in this mode, check shots with the LCD monitor. You cannot check the true picture frame in the viewfinder.

Note

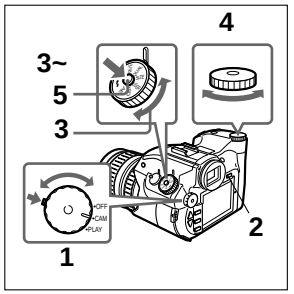
Picture size settings are indicated on the LCD panel as 1344 (1344 × 1024), 640 (640 × 480), and x2 640 (×2 D. Zoom).

5 Release the shift button.

When the picture size is set, exit the menu. The camera is ready to take pictures.

Choosing the Picture Quality Mode

Choose the picture quality of shots recorded during shooting. You can choose from Super, High, Middle and Low. The number of pictures you can take differs depending on the picture quality.



1 While pressing the mode lock (green)turn the power/mode dial to CAM.

2 Press the LCD button to turn on the LCD monitor.

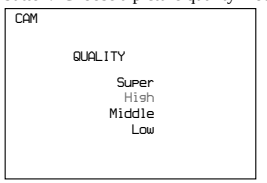
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to QLTY and press the shift button.

The QUALITY menu appears.

4 Rotate the shift dial while pressing the shift button. Choose a picture quality mode.



Picture Size	Super	High	Middle	Low
1344 × 1024	high compression	Approx.1/4	Approx.1/8	Approx.1/16
640 × 480 ×2D. Zoom	high compression	Approx.1/3	Approx.1/6	Approx.1/12
	TIFF RGB picture	JPEG Y-C compressed picture		

Super

Select this to get the highest quality picture.

High

Select this when you want to give your picture quality priority over the number of pictures.

Middle

Select this to shoot with average picture quality.

Low

Select this to give the number of pictures priority over the picture quality.

Note

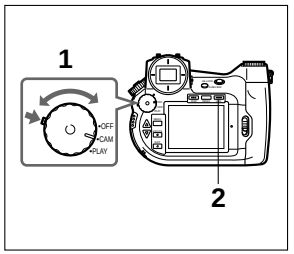
Picture quality is indicated on the LCD panel as S (Super), H (High), M (Middle), and L (Low).

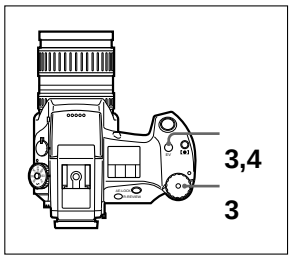
5 Release the shift button.

When the picture quality mode is set, exit the menu. The camera is ready to take pictures.

Choosing the Picture Taking Brightness (EV compensation)

When a shooting mode other than manual exposure (Manual) is chosen, you can adjust the brightness to fit the shooting conditions.





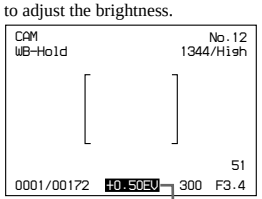
1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the LCD button to turn on the LCD monitor.

Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Rotate the shift dial while pressing the EV button to adjust the brightness.



Brightness correction (EV compensation)

You can tune within the range from -2.0 EV to +2.0 EV (in 0.25 EV units).

4 Release the EV button.

The brightness correction is set.

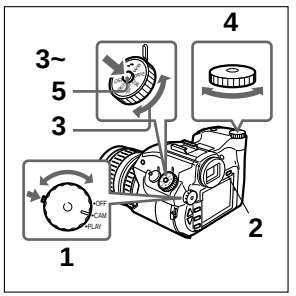
Adjusting for Natural Color Tone (White Balance Adjustment)

This camera comes equipped with the white balance function to give a more natural color tone to your pictures in a variety of shooting conditions.
Choose a white balance mode from Auto White Balance (Auto), White Balance Hold (Hold), Outdoor (Outdoor), and Indoor (Indoor). With White Balance Hold you can adjust the most appropriate white balance for the shooting condition.

Note

White balance is the balance of the level of white among the channels of R (red), G (green), and B (Blue) in a digital camera. If a picture is taken with this balance properly adjusted, reds or blues do not overwhelm the composition and a white subject is shot with appropriate level of white.

Choosing the White Balance Mode



1 While pressing the mode lock (green), turn the power mode/dial to CAM.

2 Press the LCD button to turn on the LCD monitor.

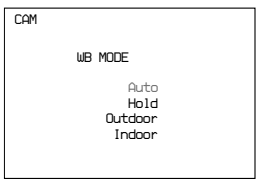
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to WB and press the shift button.

The WB MODE menu appears.

4 While pressing the shift button, rotate the shift dial to choose the white balance mode.



continued on next page

Auto (Auto White Balance)

This is the default. White balance is automatically adjusted to give a natural color tone according to the amount of light when shooting.

Hold (White Balance Hold)

Choose this when you want better color reproduction or you are shooting a monochrome subject and background. Press the WB button to adjust the white balance. For further information refer to the Adjusting the White Balance Hold section below.

Outdoor (Outdoor)

White balance is automatically adjusted to attain natural colors when shooting outdoors.

Indoor (Indoor)

White balance is automatically adjusted to attain natural colors when shooting indoors.

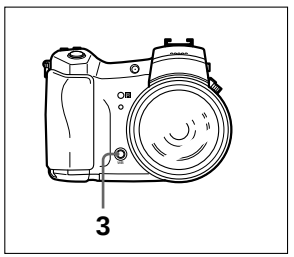
Note

White balance modes are indicated as ATW (Auto), WB/HOLD (Hold), [☀] (Outdoor), and [💡] (Indoor] on the LCD panel.

5 Release the shift button.

After the white balance mode is set, exit the menu. The camera is ready to take pictures.

Adjusting White Balance with White Balance Hold



1 Choose WHITE BALANCE HOLD as the white balance mode.

2 Point the camera at a completely white subject until it fills the viewfinder.

3 Push the WB button.

WB is indicated in the viewfinder and the white balance adjustment begins.

When the WB indicator disappears, white balance adjustment is complete.

The camera is ready to take pictures.

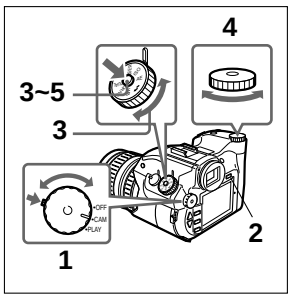
The white balance you have chosen is valid until you readjust it.

Note

When the WB indicator flashes, the white level was not successfully adjusted. Press any other operation button to leave this mode, then begin the white balance adjustment process again.

Changing the ISO Sensitivity

You can the get the same effect with this mode as is achieved by using films with different ISO sensitivities in film cameras. You can choose from ISO 100, 200 and 400.



1 While pressing the mode lock (green), turn the power/mode dial to CAM mode.

2 Push the LCD button to turn on the LCD monitor.

Note

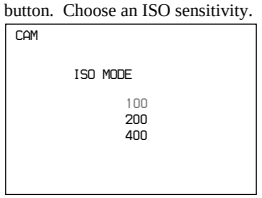
Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to ISO and then press the shift button.

The ISO MODE menu appears.

continued on next page

4 Rotate the shift dial while pressing the shift button. Choose an ISO sensitivity.



100

Sets photographic sensitivity equal to ISO 100.

200

Sets sensitivity equal to ISO 200.

400

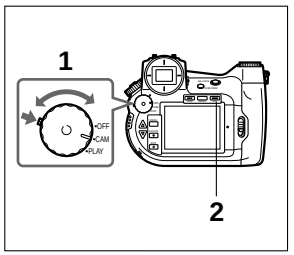
Sets sensitivity equal to ISO 400.

5 Release the shift button.

After the ISO sensitivity is set, exit the menu. The camera is ready to take pictures.

Choosing a Light Meter Reading Method

According to the picture taking conditions and purpose, you can choose the lighted area to be AVERAGE ([ ]) or SPOT ([○]) to measure light for the exposure.

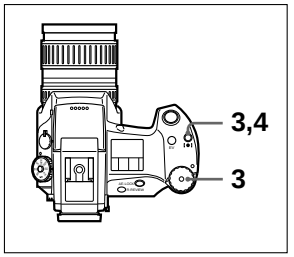


1 While pressing the mode lock (green), turn the power/mode dial to CAM.

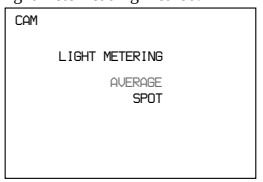
2 Press the LCD button to turn the LCD monitor on.

Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.



3 While pressing the [●] button (SPOT light meter switch button), turn the shift dial to choose the light meter reading method.



AVERAGE (light meter for average light at the center)

Appropriate for average picture taking conditions. Takes the average light meter reading of the whole screen after you have placed the focal point in the center of the viewfinder.

SPOT (Spot Light Meter)

Takes the light meter reading of a small range located in the central part of the viewfinder. This is effective for taking pictures of subjects surrounded by a lot of light, or that is backlit.

Note

Light meter options are indicated in the finderview as [ ] (AVERAGE) and [○] (SPOT).

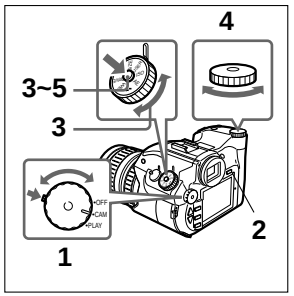
4 Release the [●] button.

After the light meter has been set, the camera is ready to take pictures.

Resetting the Content of the Settings

Resetting the modes returns the following settings to those set forth by the factory.

- mode dial settings
- Miscellaneous Settings (page 71)



1 While pressing the mode lock (green), turn the power/mode dial to CAM mode.

2 Press the LCD button to turn on the LCD monitor.

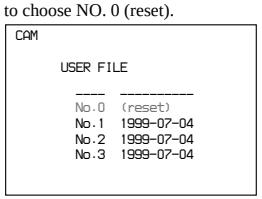
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to USER and then press the shift button.

The USER FILE menu appears.

4 While pressing the shift button, turn the shift dial to choose NO. 0 (reset).



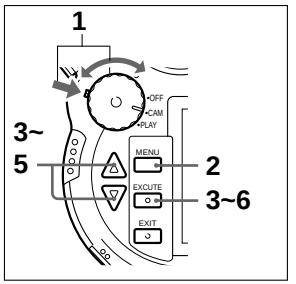
5 Release the shift button.

When the settings are reset, exit the menu. The camera is ready to take pictures.

Saving the Content of Settings

You can save the content of the following settings in up to 3 user files.

- mode dial settings
- the content of Miscellaneous Settings (page 71)

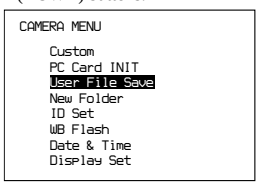


1 While pressing the mode lock (green), turn the power/mode dial to CAM mode.

2 Press the MENU button.

The LCD monitor turns on and the menu is displayed.

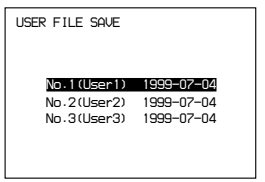
3 Choose “User File Save” using the ▲(UP)/▼(DOWN) buttons.



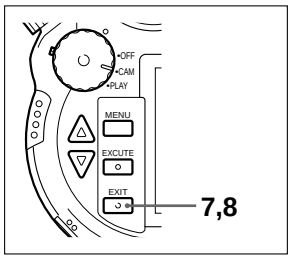
4 Press the EXECUTE button.

The USER FILE SAVE menu appears.

5 Using the ▲(UP)/▼(DOWN) buttons, choose a user file number from No. 1 to No. 3.



continued on next page



6 Press the EXECUTE button.

The setting content is saved as a user file with the chosen file number. The date and time the file is saved is also displayed.

7 Press the EXIT button.

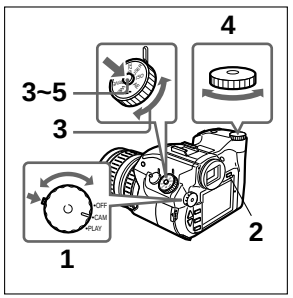
The LCD monitor display returns to the menu.

8 Press the EXIT button.

After exiting the menu, the camera is ready to take pictures.

Reading the Saved Settings

Reading the user file you have saved sets the same content in the user file.



1 While pressing the mode lock (green), turn the power/mode dial to CAM mode.

2 Press the LCD button to turn the LCD monitor on.

Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to USER and press the shift button.

The USER FILE menu appears.

4 While pressing the shift button, turn the shift dial to choose a user file number from No. 1 to No. 3.

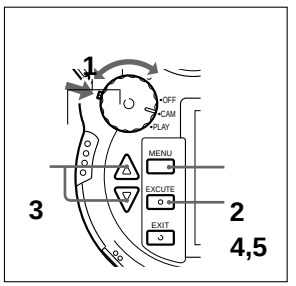
```
CAM

      USER FILE

        ----  ----------
        No.0  (reset)
        No.1  1999-07-04
        No.2  1999-07-04
        No.3  1999-07-04
```

5 Release the shift button.

The content of the selected user file number is changed, and the camera is ready to take pictures.

Making a Folder to Save Pictures

When you make a folder on a card, picures are thereafter saved in that folder. In this way you can manage pictures as you take them.



1 While pressing the mode lock (green), turn the power/mode dial to CAM mode.

2 Press the MENU button.

The LCD monitor turns on and the menu is displayed.

3 Choose “New Folder” using the ▲(UP)/▼(DOWN) buttons.

```
CAMERA MENU

    Custom
    PC Card INIT
    User File Save
    New Folder
    ID Set
    WB Flash
    Date & Time
    Display Set
```

continued on next page

4 Press the EXECUTE button.

The message “Add No.xxxx Folder OK?” appears. [xxxx] is the automatically attached folder name.

5 Press the EXECUTE button.

The folder is created, and the camera is ready to take pictures.

Pictures are thereafter saved in that folder.

Note

You can create about 510 folders on a card.

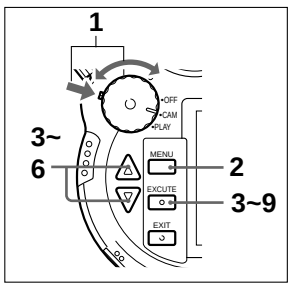
Attaching Keywords (ID Numbers) to Pictures

You can attach a keyword of up to 16 letters to a picture. The keyword is displayed when the picture is played back.
You can specify a keyword for a picture before taking it, or attach or change the keyword after the picture has been taken.

Note

You cannot attach a keyword to or change a keyword on a protected picture.

Specifying a Keyword Before Shooting

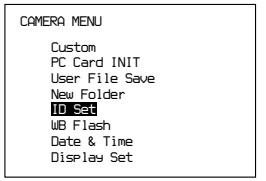


1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the MENU button.

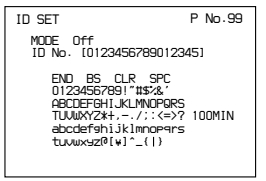
The LCD monitor turns on, and the menu is displayed.

3 Select “ID Set” using the ▲(UP)/▼(DOWN) buttons.



4 Press the EXECUTE button.

The keyword screen is displayed.



5 Select “Mode” using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

You can now change the mode setting.

6 Select “Off”, “Hold” or “Inc” using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

Off

Choose “Off” if you don't want to attach a keyword to a picture or to invalidate an existing keyword.

Hold

Choose “Hold” if you want to attach the same keyword to all pictures.

continued on next page

Inc

Choose “Inc” if you want the number of the picture to be automatically included at the end of keyword every time you take a picture.

(ex.) The keyword is PICTURE01

1st picture : PICTURE01
2nd picture : PICTURE02
〜
9th picture : PICTURE09
10th picture : PICTURE10

Note

When the automatic counter reaches [99], the number returns to [00] the next time you take a picture.
The LCD monitor display returns to the keyword screen.

7 Choose “ID No.” using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

You can now input a keyword.

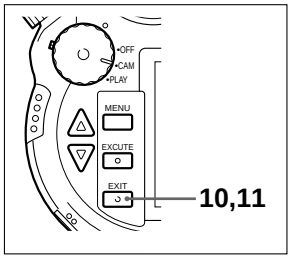
8 Choose a letter to enter using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

The letter you have chosen is input.

Repeat this step to enter the keyword. You can input up to 16 letters.

Note

Input begins from the 16th character space. If you want to input from a space in the middle, press the EXECUTE button until the cursor is automatically displayed in the correct place and then continue.



9 If you finish inputting the keyword before reaching the 16-letter limit, move the cursor to END and press the EXECUTE button.

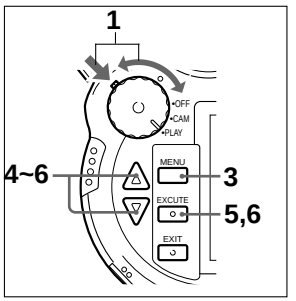
10 Press the EXIT button.

The display on the LCD monitor returns to the menu.

11 Press the EXIT button.

The menu disappears, and the camera is ready to take pictures.

Adding or Changing a Keyword to a Picture that has Already been Taken



1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

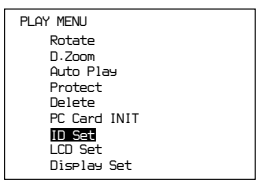
The LCD monitor tuns on.

2 Display the picture to which you want to add or change the keyword.

3 Press the MENU button.

The menu appears.

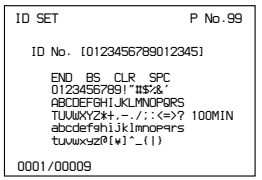
4 Select “ID Set” using the ▲(UP)/▼(DOWN) buttons.



continued on next page

5 Press the EXECUTE button.

The keyword input screen is displayed.
If a keyword has already been attached to the picture, that keyword is displayed.



6 Choose the letter you'd like to enter using the ▲(UP)/▼(DOWN) buttons. Press the EXECUTE button.

The letter you have chosen is input.
Repeat this set to enter the keyword. You can input up to 16 letters.

Note

If you want to enter the whole keyword again, set the cursor to CLR and press the EXECUTE button.

7 If you finish inputting the keyword before reaching the 16-letter limit, move the cursor to END and press the EXECUTE button.

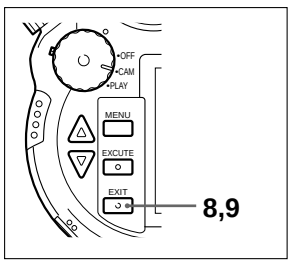
The keyword is attached and the LCD monitor returns to the menu display. Proceed to step 9.

8 Press the EXIT button.

The keyword is attached and the LCD monitor returns to the menu display.

9 Press the EXIT button.

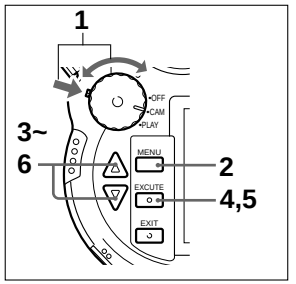
The menu disappears.



Miscellaneous Settings

The following settings are available with the digital still camera.

- Auto Power Off Function
- Interval Shooting (page 80)
- Review Function (page 82)
- Self-Timer
- Sharpness

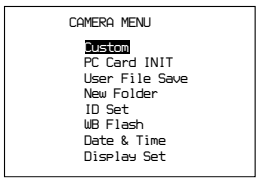


1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the MENU button.

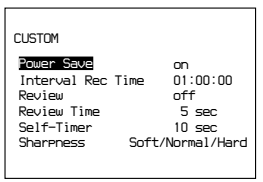
The LCD monitor turns on and the menu is displayed.

3 Choose “Custom” using the ▲(UP)/▼(DOWN) buttons.



4 Press the EXECUTE button.

The CUSTOM menu is displayed.



continued on next page

5 Choose the item you would like to set using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

You can set the item you selected.

Power Save (Auto Power Off Function)

- When set to ON, power to the LCD monitor is automatically turned off after approximately 1 minute (in CAM mode; approximately 3 minutes in PLAY mode) if the camera is not operated during that time, and power to the entire camera is turned off after approximately 4 more minutes (in CAM mode; approximately 2 more minutes in PLAY mode).
- When set to OFF, the power will not turn off over the passage of time.

Interval Rec Time (Interval Shooting)

The interval in this function can be set within the range of 1 second to 99 hours, 59 minutes, 59 seconds (in one-second units).

Depending on the picture size and quality mode during shooting, the set interval may not be kept.

Review (Automatic Review Function)

Sets the method of picture display directly after shooting.

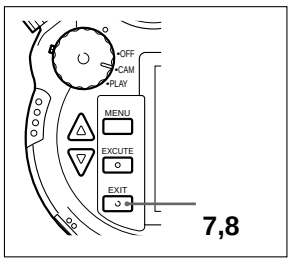
- When set to ON, pictures are automatically displayed at the time of shooting. The display time is set in the REVIEW TIME setting.
- When set to OFF, the last picture is displayed when you press the REVIEW button.

Review Time

When Review is on or when the REVIEW button is pressed, the picture display time can be set for an interval within the range of 1 to 10 seconds (in one-second units).

Self-Timer

Sets the interval from when you press the RELEASE button to the time the shutter clicks within a range of 1 to 30 seconds (in one-second units).



Sharpness

Sets the sharpness of the outline of the recorded picture.

- When set to SOFT, the picture outline is gently blurred.
- When set to NORMAL, the picture is standard.
- When set to HARD, the picture edges are clearly outlined.

6 Set the value using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

The LCD monitor display returns to the custom menu. If you want to continue, you can set another item at this time.

7 Press the EXIT button.

The LCD monitor display returns to menu.

8 Press the EXIT button.

The menu disappears and the camera is ready to take pictures.

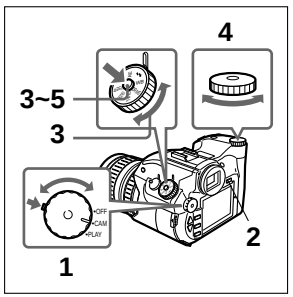
Advanced Operations Taking a Picture

Shooting with the Flash

Use the flash when taking pictures in dark places, such as indoors.
A flash is built-in in the unit.
Depending on shooting conditions, choose a flash mode from among Auto, On, Off, and External.
When shooting in the External mode, attach an external flash to the hot shoe to take flash pictures.

Flash Mode Usage Guide

Shooting Condition	Setting
Normal	Auto
The subject is lit from behind. You want to use a flash during daytime.	On
When you want to capture the natural lighting of candle-lit scenes, sunsets, etc. When you don't want the flash to go off accidentally.	Off



Setting the Flash Mode

1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the LCD button to turn the LCD monitor on.

Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

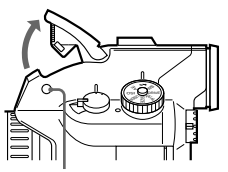
3 Turn the mode dial to ϟ and press the shift button.

This is the default mode.

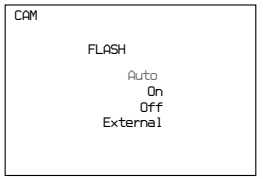
Note Concerning Use of the Built-in Flash

When photos are taken using the built-in flash, occlusion of light from the flash can occur under the following circumstances, resulting in a shadow at the bottom of the recorded image. If this occurs, change the zoom setting or use the optional external flash unit, as appropriate.

- When shots are taken at the wide-angle setting (f = 5.2 mm)
- When shots are taken at the telephoto setting (f = 26 mm) of a subject range of less than 1 meter
- When a lens hood or lens protection filter is attached to the lens


Pop-up key

4 While pressing the shift button, turn the shift dial to select a flash mode.



Auto

In conditions of insufficient light, the flash automatically goes off. This is the default mode.

On

Choose this mode when you want the flash to go off, for situations such as taking a picture of a subject that is backlit.

Off

Choose this mode when you want to take a picture with natural lighting or you don't want a strobe effect in your picture.

External

Choose this mode when you want to take a picture of a subject far from the camera and the light from the built-in flash is insufficient.

In such a case, attach an external flash to take pictures.

Note

Flash modes are indicated on the LCD panel as AUTO ϟ (Auto), ϟ (On), (Off), and ϟ EXT (External).

5 Press the shift button.

The flash mode is set and the menu disappears.

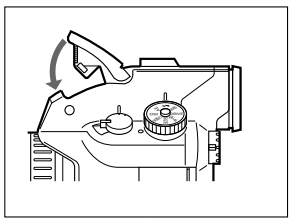
Unless the shooting mode is set to manual exposure, the shutter speed indicator or the aperture indicator flashes when it is necessary to use the flash. When this happens, press the Pop-up key to open the built-in flash, or attach an external flash to the hot shoe.

continued on next page

If the flash mode is set to Auto or On, when the flash indicator flashes, the flash is warming up.

When the flash lamp light becomes constant, the flash is ready for use.

Flashing → Continuously lit

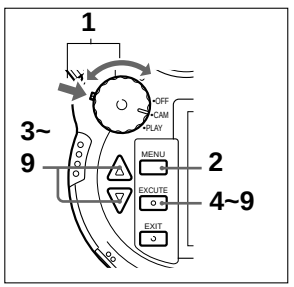


Note

When using the built-in flash, press the pop-up key to open it.
When finished with the flash, push the top of the flash down to close.

Adjusting White Balance when Taking Pictures with the Flash

You can adjust the white balance when using the flash.



1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the MENU button.

The LCD monitor turns on and the menu is displayed.

3 Select “WB Flash” using the ▲(UP)/▼(DOWN) buttons.

```
CAMERA MENU
    Custom
    PC Card INIT
    User File Save
    New Folder
    ID Set
    WB Flash
    Date & Time
    Display Set
```


4 Press the EXECUTE button.

The WB FLASH menu is displayed.

5 Select “Flash Mode” using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

```
WB FLASH

 Flash Mode   Internal/External
 Interval     10 sec(3~10)
 Start
```

You can now set the flash mode.

6 Choose “Internal” (built-in flash) or “External” (external flash) using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

Choose “Internal” to use the built-in flash or “External” to use the external flash and press the EXECUTE button.

7 If you chose “External” in step 6, select “Interval” using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

You can choose the interval during which to have the flash light.
Set an interval within the range of 3 to 10 seconds (in one-second units) using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

Note

When using an external flash, set the amount of light for the flash before adjusting the white balance to avoid extreme brightness or darkness in your pictures.

8 Point the camera toward a completely white subject until it completely fills the viewfinder.

continued on next page

9 Select “Start” using the ▲(UP)/▼(DOWN) buttons and then press EXECUTE.

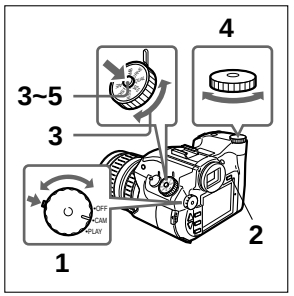
“WB” is displayed in the viewfinder and white balance adjustment begins.
After the flash lights about 10 times, the WB indicator goes off. The white balance adjustment is complete.
The white balance value is valid until it is adjusted again.

Note

When the WB indicator flashes, the white balance is not successfully being adjusted. Exit this mode by pressing any operation button besides the WB button and readjust the white balance again.

Continuous Shooting

In this mode you can continuously shoot pictures until you reach the maximum number by keeping the release button pressed.



1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Turn the LCD monitor on by pressing the LCD button.

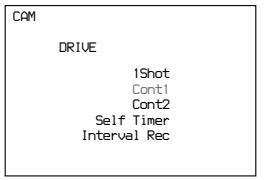
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to DRIVE and press the shift button.

The DRIVE menu appears.

4 While pressing the shift button, turn the shift dial to select “Cont1” or “Cont2.”



Cont1

In this mode, when the shooting mode is set to a mode other than manual exposure, the exposure is automatically adjusted every time a picture is taken.

Cont2

In this mode, the settings of the first picture are kept as pictures are taken in succession.
The continuous picture taking speed is faster in this mode than that in Cont1.

Note

These modes are indicated on the LCD panel as 1 (Cont1) and 2 (Cont2).

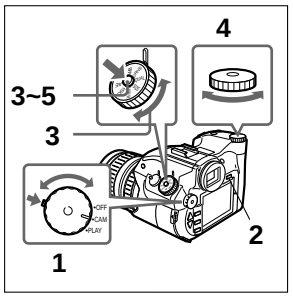
5 Release the shift button.

The continuous shooting mode is set, and the menu disappears. When taking pictures, keeping the release button pressed activates continuous shooting.
Auto focus will not work during continuous shooting. Set the focus before you start continuous shooting.

continued on next page

Taking a Picture at Regular Intervals (Interval Shooting)

In this mode, after pressing the release button, pictures are continuously taken at regular intervals.
How to set the shooting interval is described in the Miscellaneous Settings section (page 71).



1 While pressing the mode lock (green), turn the power/mode lock to CAM.

2 Press the LCD button to turn the LCD monitor on.

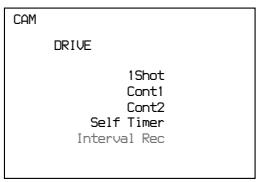
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to DRIVE and press the shift button.

The DRIVE menu appears.

4 While pressing the shift button, turn the shift dial to select “Interval Rec.”



Note

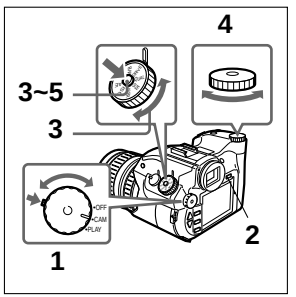
This option is indicated on the LCD panel as INT.

5 Release the shift button.

The interval time is set, and the menu disappears. When you press the release button, interval shooting starts.
To stop interval shooting, set another shooting method besides interval shooting or set the power/mode dial to OFF or PLAY.

Taking a Picture with the Self-Timer

In this mode, after pressing the release button, the shutter automatically clicks after a set period of time.
How to set the time between the pressing of the release button and the shutter release is described in the Miscellaneous Settings section (page 71).



1 While pressing the mode lock (green), turn the power/mode dial to CAM.

2 Press the LCD button to turn the LCD monitor on.

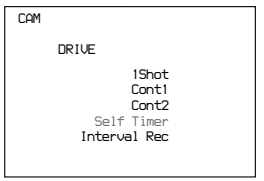
Note

Settings can also be confirmed on the LCD panel. When checking the settings on the LCD panel, this step is not necessary.

3 Turn the mode dial to DRIVE and press the shift button.

The DRIVE menu appears.

4 While pressing the shift button, turn the shift dial to select “Self Timer.”



5 Release the shift button.

The self-timer is set and the menu disappears. When you press the release button completely, the self-timer starts.

Note

When taking photographs in the auto focus mode, press the release button halfway to focus, then press it all the way to take the shot.

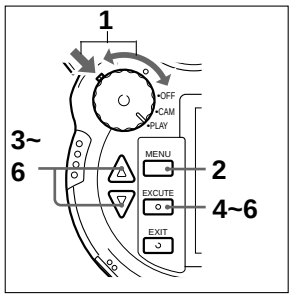
Checking Pictures Directly After Shooting (Review Function)

When the REVIEW button is pressed directly after taking a picture, the picture is displayed on the LCD monitor in this mode.
When you turn the review function on in Miscellaneous Settings, pictures are displayed automatically, without having to press the REVIEW button.

Advanced Operations Playback

Rotating the Picture

You can rotate the picture 90° clockwise or counter-clockwise, or 180° during playback.



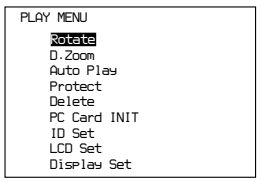
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The LCD monitor turns on.

2 Push the MENU button.

The menu is displayed on the LCD monitor.

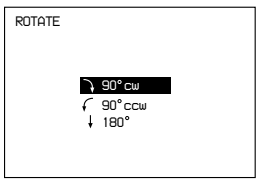
3 Choose “Rotate” using the ▲(UP)/▼(DOWN) buttons.



4 Press the EXECUTE button.

The ROTATE menu is displayed.

5 Choose an angle of rotation using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.



90° cw (rotation of 90° to the right)
Rotates the picture 90° clockwise.

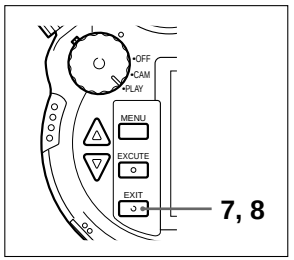
90° ccw (rotation of 90° to the left)
Rotates the picture 90° counter-clockwise.

180° (rotation of 180°)
Rotates the picture 180°.

continued on next page

The picture is displayed at the angle of rotation chosen.

6 Rotate the picture as described in step 5 as often as necessary.



7 Press the EXIT button.

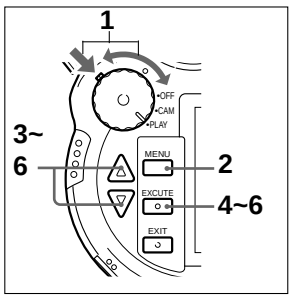
The LCD monitor returns to the menu display. Note, however, that infomation of rotation changes made to protected pictures is not saved.

8 Press the EXIT button.

The menu disappears.

Viewing an Enlarged Picture

You can view an enlarged detail of a picture during playback.



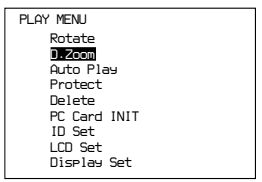
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The LCD monitor turns on.

2 Press the MENU button.

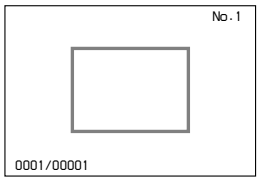
The menu is displayed on the LCD monitor.

3 Select “D. Zoom” using the ▲(UP)/▼(DOWN) buttons.



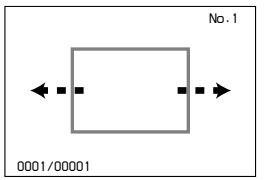
4 Press the EXECUTE button.

The area of the picture to be enlarged is framed with a green line.



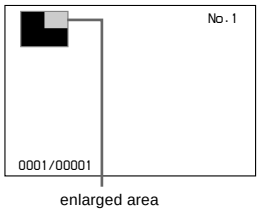
5 Select the area to be enlarged using the ▲(UP)/▼(DOWN) buttons.

The frame moves left when the ▲(UP) button is pressed.
The frame moves right when the ▼(DOWN) button is pushed.

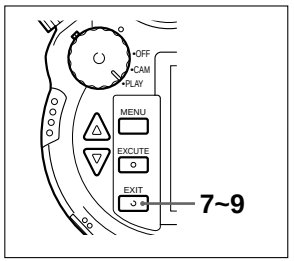


6 Press the EXECUTE button.

The selected area is enlarged and displayed, and the position of the enlarged area is displayed in the upper left corner.



continued on next page



Note

While viewing this screen, you can change the area to be enlarged by pressing the ▲(UP)/▼(DOWN) buttons.

7 Press the EXIT button.

The enlargement indicator is cancelled.

8 Press the EXIT button.

The menu returns to the LCD monitor display.

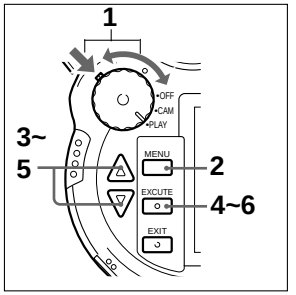
9 Press the EXIT button.

The menu disappears.

Advanced Operations Erasing

Erasing All Pictures

You can erase all saved pictures that are no longer needed from the card. However, you cannot erase pictures that have been protected.



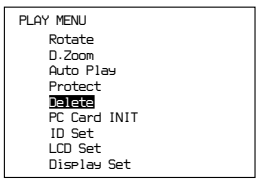
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The LCD monitor turns on.

2 Press the MENU button.

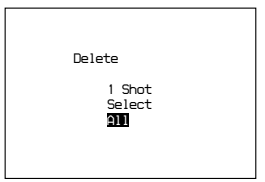
The menu appears on the LCD monitor.

3 Select “Delete” using the ▲(UP)/▼(DOWN) buttons.



4 Press the EXECUTE button.

The Delete menu appears.



5 Select “All” using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

The message "Do you delete all images?" appears.

Note

To cancel erase, press the EXIT button.

continued on next page

6 Press the EXECUTE buttons.

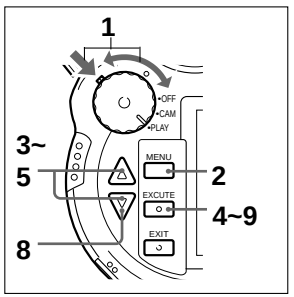
Picture erasing begins.
When deletion is finished, the LCD monitor display returns to the state shown in step 1.

Caution

Do not remove the card during picture deletion. Damage to the Memory Stick or PC Card may occur.

Erasing Selected Pictures

You can erase selected saved pictures, with the exception of protected pictures, from the card.



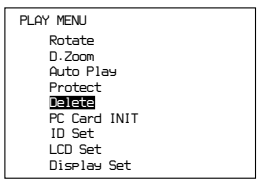
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The LCD monitor turns on.

2 Press the MENU button.

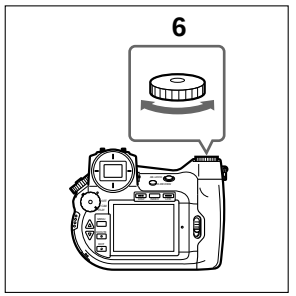
The menu is displayed on the LCD monitor.

3 Choose “Delete” using the ▲(UP)/▼(DOWN) buttons.



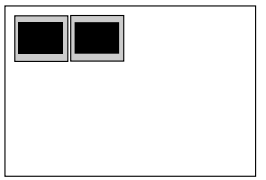
4 Press the EXECUTE buttons.

The Delete menu is displayed.



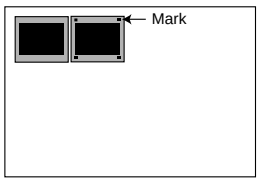
5 Choose “Select” using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

The screen from which to choose pictures for deletion appears.



6 Turn the shift dial to the picture you would like to erase and press the EXECUTE button.

The chosen picture is marked.



Note

Protected pictures cannot be chosen.

7 Repeat step 6 to choose other pictures to be erased.

8 Press the ▼ (DOWN) button.

The message "Do you delete x image(s)?" is displayed. [x] is the number of pictures chosen.

Note

To cancel deletion, press the EXIT button.

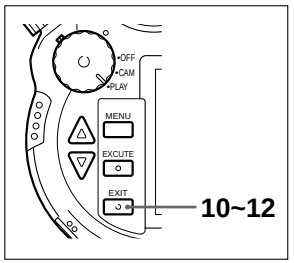
continued on next page

9 Press the EXECUTE button.

Picture erasing begins.
When deletion is finished, the LCD monitor returns to the state shown in step 5.

Caution

Do not remove the card during picture deletion. Damage to the Memory Stick or PC Card may occur.



10 Press the EXIT button.

The LCD monitor display returns to the state shown in step 4.

11 Press the EXIT button.

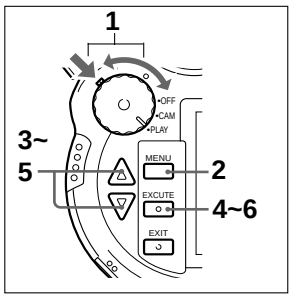
The LCD monitor display returns to the menu.

12 Press the EXIT button.

The menu disappears.

Erasing Pictures during Playback

You can erase pictures shown on the LCD monitor during playback. However, protected pictures cannot be erased.



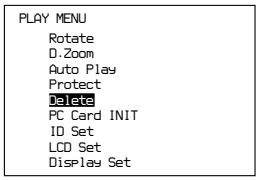
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The LCD monitor turns on.

2 Press the MENU button.

The menu is displayed on the LCD monitor.

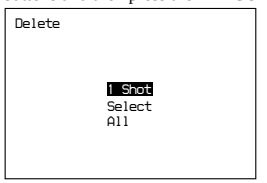
3 Select “Delete” using the ▲(UP)/▼(DOWN) buttons.



4 Press the EXECUTE button.

The Delete menu is displayed.

5 Select “1 Shot” using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.



The message "Do you delete this image?" appears.

Note

To cancel erase, press the EXIT button.

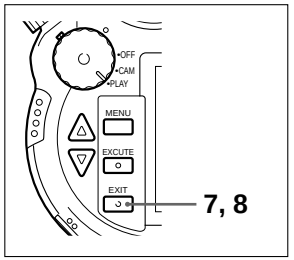
6 Press the EXECUTE button.

Picture erasing begins.
When deletion is finished, the LCD monitor returns to the state shown in step 4.

Caution

Do not remove the card during picture deletion. Damage to the Memory Stick or PC Card may occur.

continued on next page



7 Press the EXIT button.

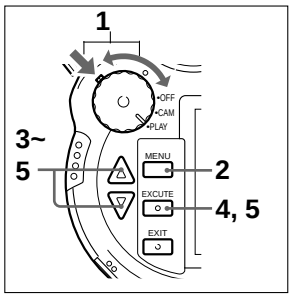
The LCD monitor display returns to the menu.

8 Press the EXIT button.

The menu disappears.

Making it Impossible to Erase Important Pictures (Protect)

You can save pictures from being accidentally erased. This is called "protecting" the picture. You can protect pictures when they are shown on the LCD monitor during playback.



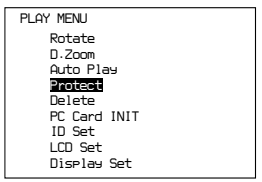
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

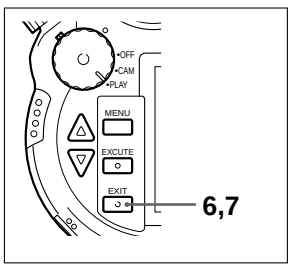
The LCD monitor turns on.

2 Press the MENU button.

The menu is displayed on the LCD monitor.

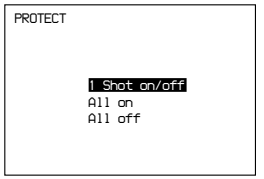
3 Select “Protect” using the ▲(UP)/▼(DOWN) buttons.





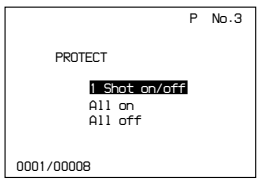
4 Press the EXECUTE button.

The PROTECT menu is displayed.



5 Choose “1 Shot on/off” using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

The chosen picture is protected, indicated by a P on the LCD monitor.



Notes

- When you perform the same operation on a picture that has already been protected, the protect function is removed.
- When you select “All on” or “All off” from the PROTECT menu and press the EXECUTE button, all the pictures are protected, or protect is removed from all pictures.

6 Press the EXIT button.

The LCD monitor display returns to the menu.

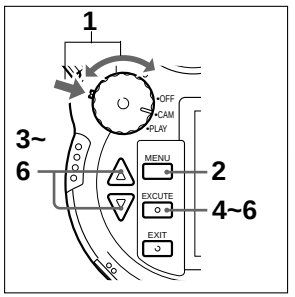
7 Press the EXIT button.

The menu disappears.

Advanced Operations Miscellaneous

Setting the LCD Monitor Display

You can set whether or not the LCD monitor displays necessary information for playback or taking a picture, such as picture size or AF/AE frame.



1 While pressing the mode lock (green), turn the power/mode dial to CAM.

Note

In this section, setting the LCD monitor display is explained while the power/mode dial is set to CAM, but the same operation can be done while the power/mode dial is set to PLAY.

2 Press the MENU button.

The LCD monitor turns on, and the menu is displayed.

3 Select “Display Set” using the ▲(UP)/▼(DOWN) buttons.

```
CAMERA MENU
    Custom
    PC Card INIT
    User File Save
    New Folder
    ID Set
    WB Flash
    Date & Time
    Display Set
```

4 Press the EXECUTE button.

The display set menu appears.

5 Select the item you want to set using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.

The selected item is ready to change.

```
DISPLAY SET
    Size/Qlty/Rotate    on
    Folder/File Name    on
    ID No.              on
    Date/Time           on
    Remaining Shot      on
    Tv/Av/Evcomp        on
    AF/AE Frame         on
```

6 Select “on” or “off” using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

Items which can be set are listed below:

Size/Qlty/Rotate (Picture size/Picture quality/Rotation)

Folder/File Name

ID No. (Keyword)

Date/Time

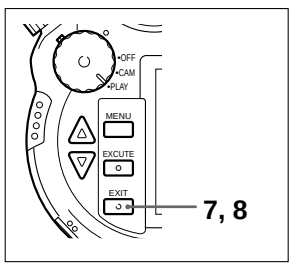
Remaining Shot

Tv/Av/Evcomp (Shutter Speed/Aperture/EV compensation)

AF/AE Frame

When each item is set to on or off, the LCD display returns to the state shown in step 3.

If you want to change the settings of other items, return to step 5 and repeat the same operation.



7 Press the EXIT button.

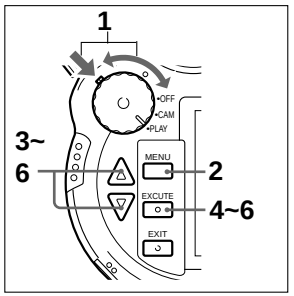
The LCD monitor display returns to the menu.

8 Press the EXIT button.

The menu disappears.

Adjusting Picture Display on the LCD Monitor

Adjusts picture display items such as contrast, brightness, and display range on the LCD monitor.



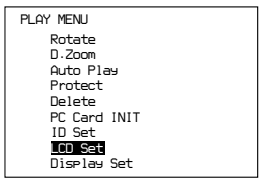
1 While pressing the mode lock (green), turn the power/mode dial to PLAY.

The LCD monitor turns on.

2 Press the MENU button.

The menu is displayed on the LCD monitor.

3 Select “LCD Set” using the ▲(UP)/▼(DOWN) buttons.

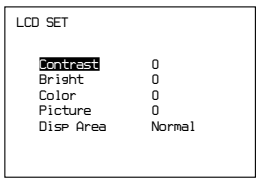


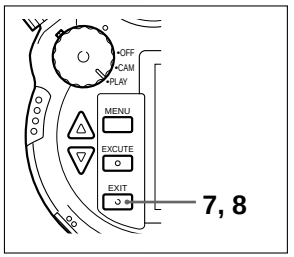
4 Press the EXECUTE button.

The LCD set menu is displayed.

5 Select an item using the ▲(UP)/▼(DOWN) buttons and then press the EXECUTE button.

You can set the chosen item.





6 Choose a value using the ▲(UP)/▼(DOWN) buttons and press the EXECUTE button.
The items you can set are listed below:

Contrast, Bright, Color or Picture

Contrast, brightness, color density or picture sharpness can be set within a -10 to +10 range (in units of 1).

Disp Area (Display area)

When NORMAL is chosen, the picture is displayed after being resized to fit the frame 100%.
When OVER is chosen, the picture is displayed without being resized.

When the values for the chosen items have been set, the LCD display returns to the state shown in step 5.
If you want to set another item, repeat the same operation from step 5.

7 Press the EXIT button.

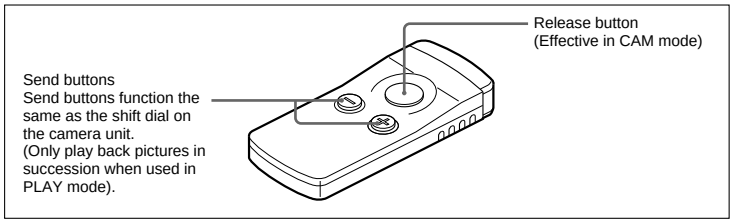
The LCD monitor returns to the menu.

8 Press the EXIT button.

The menu disappears.

Operating the Wireless Remote Control

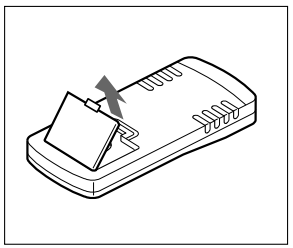
Using the supplied wireless remote control RM-S7D, you can perform the same release button and shift dial operations as on the camera unit.
The remote control is convenient when you want to take pictures away from the camera or for playing back pictures on a television.


Release button
(Effective in CAM mode)
Send buttons
Send buttons function the same as the shift dial on the camera unit.
(Only play back pictures in succession when used in PLAY mode).

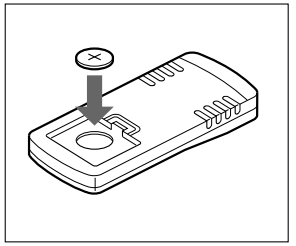
Note

The self-timer lamp on the front of the camera lights up briefly as signals from the remote control are received.
When you push the release button with the focus mode switch set to AF, the focus is automatically set before the picture is taken. There is a short time lag from the time you press the release button until the picture is taken.
If you want to take a picture without the time lag set the focus mode switch to MF. After manually adjusting the focus, press the release button to take the picture.

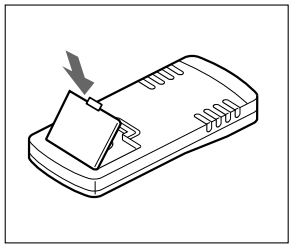
Inserting the Battery into the Remote Control



1 Slide the battery cover in the direction of the ▲ mark while pushing the cover.



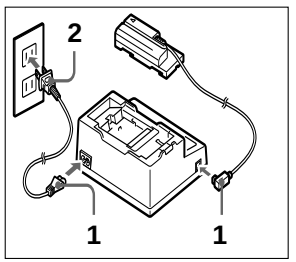
2 Insert a lithium button battery CR2025 into the battery case, making sure the + (plus) side is visible.



3 Return the battery cover to its original position.

Using a Wall Socket

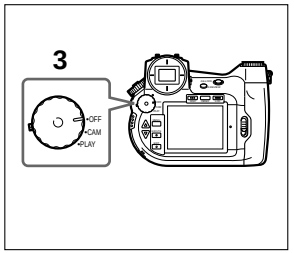
To take or play back pictures without using a battery, plug the camera into a wall socket using the battery charger AC-V700 (not supplied) and DC power cable DK-415 (supplied with the AC-V700).



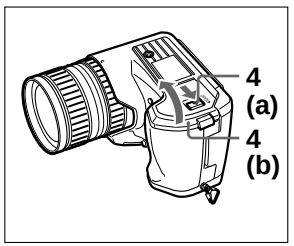
1 Connect the DC power cable and the AC power cable to the battery charger.

2 Plug the AC plug from the power cable into the wall socket.

continued on next page

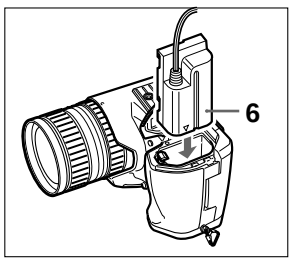


3 Make sure the power/mode dial on the camera is set to OFF.



4 Slide the battery cover lock in the direction of the ▲ mark (a), and open the battery cover (b).

5 Remove the rubber from inside the battery cover.



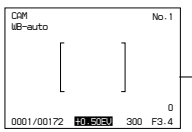
6 Insert the DC power cable connector ▲ mark side first into the battery case until it locks firmly into place.

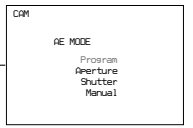
7 Put the cable into the battery cover groove and close the battery cover.

Menu Summary

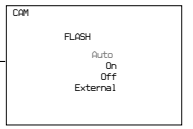
There are three menus in the camera: Shooting Menu, Camera Menu, and Playback Menu.

Mode Menu
The menu for setting shooting conditions. To call up this menu, set the power/mode dial to CAM, turn the mode dial and press the shift button.

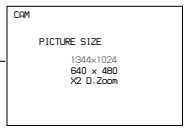




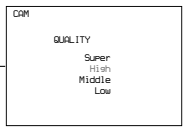
Shooting Mode
Sets the exposure. Choose from Program AE (Program), Aperture Priority AE (Aperture), Shutter Speed AE (Shutter) or Manual Exposure (Manual). → Page 51



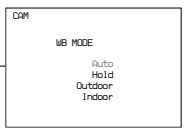
Flash
Sets the flash. Choose from Automatic Flash (Auto), On (On), Off (Off), or External Flash (External). → Page 74



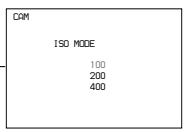
Picture Size
Sets the picture size. Choose from 1344 × 1024, 640 × 480, or ×2 D. Zoom. → Page 53



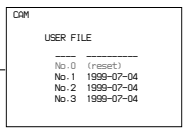
Picture Quality Mode
Sets the picture quality. Choose from Super, High, Midle, or Low. → Page 54



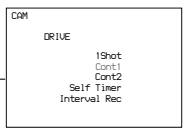
White Balance Mode
Sets the method of white balance adjustment. Choose from Auto White Balance (Auto), White Balance Hold (Hold), Outdoor, or Indoor. → Page 57



ISO Sensitivity
Sets the ISO sensitivity. Choose from ISO 100, 200, or 400. → Page 59



User File
Resets setting content and reads the setting content that has been saved as user files. → Pages 62, 64

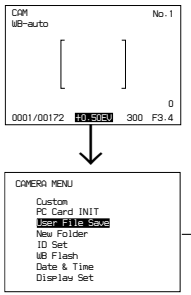


Shooting Method
Sets the shooting method. Choose from Normal Shooting (1 Shot), Continuous Shooting 1 (Cont1), Continuous Shooting 2 (Cont2), Self-Timer, or Interval Shooting (Interval Timer). → Pages 78, 80, 81

continued on next page

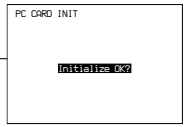
Camera Menu

The menu for setting the shooting conditions and functions of the camera. To call up the camera menu, turn the power/mode dial to the CAM mode position and press the MENU button.



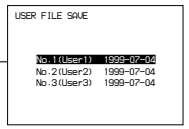
Miscellaneous Settings

Sets each function of Auto Power Off, Interval Shooting, Review, Self-Timer, and Sharpness. → Page 71



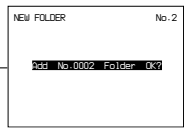
Card Initialization

Initializes the card inserted in the camera. → Page 30



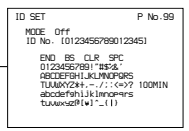
User File Save

Saves the content set by the mode dial and the content set in the custom menu as user files. Up to 3 user files can be saved. → Page 63



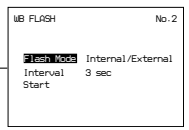
New Folder

Creates folders in which to save pictures. → Page 65



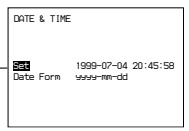
Keyword Setting

Attaches a keyword of up to 16 letters to a picture. → Page 66



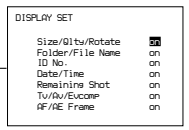
White Balance Setting (with Flash Use)

Adjusts white balance when using a flash. → Page 76



Date and Time Setting

Uses a clock built-in to the camera to record the correct time and date. → Page 26

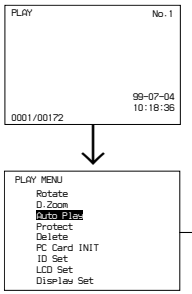


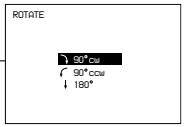
LCD Monitor Display Setting

Sets whether or not information necessary for shooting or playing back a picture such as picture size and AE/AF frame is displayed on the LCD monitor. → Page 94

Playback Menu

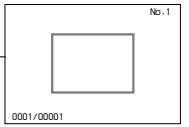
The menu for setting different picture and playback options. To call up the menu, turn the power/mode dial to the PLAY position and press the MENU button.





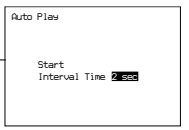
Picture Rotation

Rotates a picture 90° clockwise or counter-clockwise, or 180° during playback. → Page 83



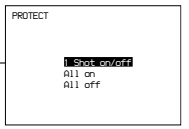
Picture Enlargement

Enlarges and displays a detail of a picture during playback. → Page 84



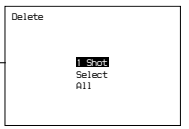
Automatic Cycle Viewing

Pictures are played back one by one, automatically, on the screen. → Page 40



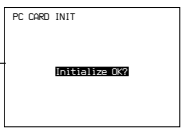
Protect

Saves important pictures from being accidentally erased. This is called "protecting" the picture. → Page 92



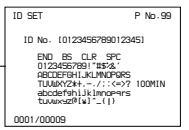
Erasing Pictures

Erases unnecessary pictures saved on a card. → Page 87



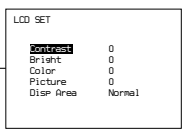
Card Initialization

Initializes the card inserted in the camera. → Page 30



Keyword Setting

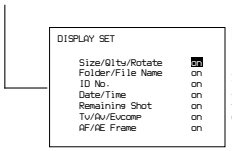
Attaches a keyword of up to 16 letters to a picture. → Page 66



LCD Monitor Picture Display Fine Tuning

Sets whether or not necessary information for picture taking or playback, such as picture size or AF/AE frame, is displayed on the LCD monitor. → Page 96

continued on next page



LCD Monitor Display Setting

Sets whether or not necessary information for picture taking or playback, such as picture size or AF/AE frame, is displayed on the LCD monitor. → Page 94

Maintenance

Maintenance of the Camera Surface

If the camera surface gets dirty, lighty wipe with a dry cloth. If the camera is very dirty, wipe with a cloth moistened with a small amount of neutral detergent and wipe dry.

- When using a chemical cleaning cloth, follow the manufacturer's instructions.
- Do not use volitile liquids such as alcohol, thinner or benzine on the camera surface. They will remove paint from the surface finish.

Maintenance of the Lens Surface

Remove dust on the lens surface with a blower brush or soft cloth. If the lens is very dirty, wipe gently with a soft cloth or lens cleaning tissue, taking care not to scratch the lens surface.

Condensation

Condensation may form on the lens when the camera is brought from a cold place to a warm place. There is no warning indicator to signal condensation on the lens. If you detect moisture, turn off the power and wait about one hour for the condensation to dissipate.

Troubleshooting

Before bringing in your camera for servicing, check the following table as a guide to troubleshoot the problem. If the problem cannot be corrected, contact your Sony dealer or Sony Customer Service. If messages you are unfamiliar with appear in the viewfinder, or on the LCD panel or LCD monitor, refer to “Warning Indicators” on page 109.

Symptom	Cause	Corrective Action
Camera is inoperable.	Battery pack is empty. (battery warning indicator displays)	Charge the battery pack. (page 23)
	AC power adaptor/charger is not firmly connected.	Check the DC power cable and AC power cable connection. (page 99)
	Internal system is malfunctioning.	Disconnect the battery or power cable, wait one minute and reconnect. Turn the power on and check to make sure the camera is functioning correctly.
Power cuts out.	When the power/mode dial is set to CAM, monitor turns off if you don't operate it for about 1 minute (3 minutes in PLAY). Camera turns off completely if not operated for another 4 minutes (in CAM) or another 2 minutes (in PLAY).	Press the release button halfway or operate the power/ function dial to restore power.
Battery power depletes quickly.	Battery pack is not charged enough.	Charge the battery fully. (page 23)
	Battery has reached the end of its life.	Replace it with a new chargeable lithium ion battery. (page 24)
Cannot take pictures.	Power/mode dial is not set to CAM.	Set the power/mode dial to CAM.
	The card has reached the picture taking limit.	Erase unnecessary pictures before taking more pictures. (page 87)
	The battery needs recharging.	Charge the rechargeable lithium ion battery. (page 23)
Auto focus does not work.	AF switch is set to MF (manual focus)	Set the AF switch to AF (auto focus).
	Pictures are being taken in conditions where auto focus does not work.	Manually set the focus. (page 38)
Picture is dark.	Subject is backlit. There is insufficient light.	Correct the brightness. (page 56)
When shooting a bright subject, vertical lines appear on the picture.	These lines are called "smears."	The camera is not malfunctioning.
Black dots appear on LCD monitor or red, blue, and green dots cannot be erased.	Extremely precise technology is being used for the liquid crystal display.	The camera is not malfunctioning. The dots will not be recorded.
LCD display in the viewfinder is blurry.	The eyesight level is not properly adjusted.	Adjust the viewfinder focus to suit your eyesight. (page 34)
Picture is improperly exposed.	EV compensation is set.	Set the EV compensation to +/- 0 and try shooting again. (page 56)
	The camera is in shutter speed priority AE mode and has been set to an inappropriate speed.	Change the shutter speed to a more suitable speed using the shift dial. (page 51)
Picture is improperly exposed when using the flash.	The flash is too far from the subject.	Use the flash within a range of approx. 1.0 m to 2.5 m.
The flash does not work.	There is enough light, and the flash is not necessary. (when the flash is set to “Auto”)	When you want the flash to always go off, set it to “On”. (page 74)
	The flash is set to “Off”.	Set the flash to “Auto” or “On”. (page 74)

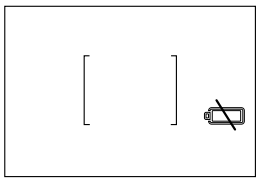
continued on next page

Symptom	Cause	Corrective Action
Picture is not recorded when you press the release button.	A card is not inserted in the camera.	Insert a card in the camera. (page 29)
	There are no more remaining shots.	Insert a new card.
		Change the picture quality or erase unnecessary pictures. Check the remaining shot number and try again. (pages 54, 87)
Vertical lines appear around lights or candle flames, etc., shot against a dark background.	This occurs when there is a strong contrast between the background and the subject.	The camera is not malfunctioning.
Auto focus does not work when shooting at night.	Auto focus may not work when taking pictures at night, or if the subject is dark.	Manually set the focus.
Camera will not play back.	Power/mode dial is not set to PLAY.	Set the power/mode dial to PLAY.
	The battery needs to be charged.	Charge the battery pack. (page 23)
	There are no pictures saved on the card.	Take a picture and save it on the card.
Cannot erase a picture.	The picture is protected or the card itself is write-protected.	Cancel the protect function. (page 92) If the card is write protected, turn the write-protect switch to OFF.
There is interference on the picture or LCD monitor.	The camera is near equipment with strong electromagnetic radiation, such as a TV.	Move the camera away from such equipment.

Warning Indicators

LCD Monitor

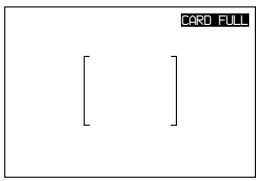
The following warning indicators appear on the LCD monitor.



Low Battery Charge Indicator

When the battery voltage becomes low, the remaining battery time indicator on the LCD monitor changes to the indicator.*

* When using the AC power adaptor/charger, this indicator does not appear.



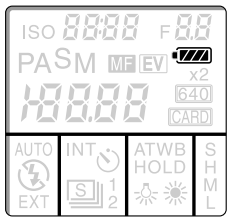
No Shot Available

If you press the release button when the picture file on the card is full, the message CARD FULL is displayed in red for 4 seconds.

To remove this indicator, erase pictures from the file or insert a new card.

LCD Panel

The following warning indicators appear on the LCD panel.



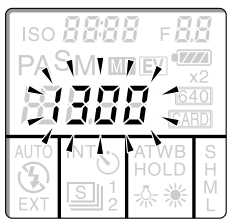
Battery Indicator

As the battery voltage becomes low, is indicated on the LCD panel.

The battery indicator changes as follows:

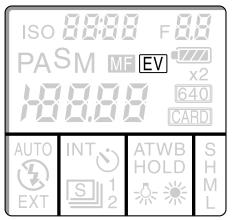
Battery Indicator	Battery Charge Amount Standard (A fully charged battery is 100%)
	100 to 80%
	80 to 60%
	60 to 40%
	40 to 20%
	20 to 10%
Flashing	Camera operation will stop within 1 minute. Change with a charged battery pack.

*When using the AC power adaptor/charger, this indicator does not appear.



No Shot Available display

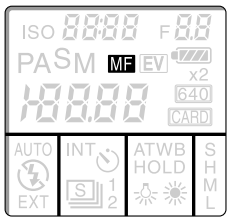
When no further image files can be recorded on the file, the image number flashes to indicate that the card is full.



EV Indicator

The letters EV appear whenever EV compensation mode is on.

When EV compensation is turned to +/- 0.0, the indicator does not appear.



Auto Focus Off Indicator

When the AF switch is turned to MF (manual focus), the MF indicator appears.

Error Messages

The following messages are displayed on the camera's LCD monitor or LCD panel or in the viewfinder. Refer to list below for the meaning of the error message.

Message on LCD Panel or in Viewfinder	Message on LCD Monitor	Meaning and Corrective Action
Card	NO CARD	A card is not inserted. → Insert a card into the camera. (page 29)
Full	CARD FULL	The maximum number of pictures has been recorded on the card. → Erase unnecessary pictures (page 87) or insert a new card. (page 29)
Err03	IMAGE FULL	Number of created files on the card has reached 9999. → Erase unnecessary files (page 87) or insert a new card. (page 29)
Err04	IMAGE NO. FULL	Picture file names have reached 99,999. → Format card to save pictures on the computer (page 30) or insert a new card. (page 29)
Err05	FOLDER FULL	The maximum number of folders has been reached. → The maximum number of folders possible is 510. (page 65)
Err06	FOLDER NO. FULL	Folder names have reached 9,999. → Numbers above 9,999 cannot be attached to folder names. (page 65)
Err07	NO IMAGE	A card on which no pictures had been recorded was attempted to be played back. → Take pictures on the card and try again. (page 34)
Err08	ONLY 1 IMAGE	A card which had one or fewer pictures on it was attempted to be played back in cycle viewing mode. → After taking at least 2 pictures (page 34), try cycle viewing again. (page 40)
Err09	PROTECTED	A protected picture was attempted to be erased. → Cancel protect and try again. (page 92)
Err10	WRITE PROTECT	A picture was attempted to be taken or erased on a write-protected card. → Set the write-protect switch on the card to OFF and take or erase the picture.
Err11	NO ROTATION INFO	Rotation was attempted on a picture that was not recorded by the camera. → Only pictures recorded by the camera can be rotated. (page 83)
Err12	NO ID INFO	A keyword was attempted to be added to a picture that was not recorded by the camera. → Keywords can only be added to pictures recorded by the camera. (page 83)
Err13	DATE & TIME NOT SET	The lithium button battery used to maintain the internal clock has run out. → Contact your nearest Sony dealer or Sony Customer Service. (page 27)
Err14	FORMAT ERROR	A card that cannot be used in the camera is inserted. → Initialize the card in the camera (page 30), or insert a card that can be used. (page 28)
Err15	READ ERROR	A picture that has not been recorded by the camera or has damaged data is attempted to be played back. → Play back a picture recorded by the camera or that is undamaged.
Err16	WRITE ERROR	The picture could not be recorded properly on the card. → Retake the picture.
——	BUSY	The card is being accessed. The indicator disappears when access is complete. → Wait until the indicator disappears.

Specifications

General

Power source	InfoLITHIUM battery pack NP-F550 (not supplied) or AC power adaptor/charger AC-V700 (not supplied)
Power consumption	0.9 A, DC7.2 V when shooting (with LCD monitor on)
	0.6 A, DC7.2 V when playing back (with LCD monitor on)
Operating temperature	0°C to +40°C (32°F to 104°F)
Storage temperature	–20°C to +60°C (-4°F to 140°F)
Dimensions	130 × 100 × 150mm (5 1/5 × 4 × 6 inches) (W × H × L)
Mass	820 g approx. (excluding the battery pack and PC Card)

System

Camera type	Digital still camera
Picture quality modes	Super – TIFF (Non compression) High, Middle, Low – JPEG (compression)
Recording medium	PCMCIA ATA TYPE II card
	Sony Memory Stick (for use with Memory Stick/PC Card Adapter)
Picture elements	1/2 inch single-plate, solid-state picture element (all elements read)
	Total dot number: 1,500,000 pixels approx.
Optical viewfinder	Focusing screen with built-in double imaging, single ref type
LCD monitor	2.5" low-temperature, polysilicon TFT with 1,800,000 pixels
Minimum focal length	20 cm (focal distance for the whole area)
Aperture	F2 to F11 (wide angle)
	F2.4 to F11 (telephoto) variable
Shutter speed	4 to 1/2000 sec. (In AE mode, 1/30 to 1/2000 sec.)
	combined use mechanical shutter and electric shutter
Continuous shooting speed	Maximum 2 frames/sec. (Picture quality mode is low, size is 640 × 480)

Lens	5× zoom
	f = 5.2 to 26mm (equivalent to 28 to 140 for 35mm film cameras), 13 lens, 10 group, filter diameter: 62mm
Photographic sensitivity	ISO 100, 200, 400
Focus control	CCD TTL auto/manual focus mechanism
Light Meter	Central focusing average light meter/SPOT light meter, AE LOCK function
Exposure control	Program AE, shutter speed priority AE, aperture priority AE, manual exposure
EV compensation	–2 to +2 EV (0.25 EV increments)
Internal flash	External light sensor, self-adjusting system: adjusts to all shutter speeds
	Guide Number: GN10
	Range: 1.0 to 2.5 meters approx. (ISO 100, without EV compensation)
	Flash modes: Auto/On/Off
White balance	Auto/One push hold/Indoor/Outdoor

Input/Output Terminals

Video output terminal	NTSC model: 1.0Vp-p 75Ω, unbalanced, sync negative
	PAL model: 1.0Vp-p 75Ω, unbalanced, sync negative
Hot shoe	For use with external flash

continued on next page

Miscellaneous

Accessories

Viewfinder cap (1)
Lens cap (fitted on the lens, 1)
Video cable (1)
Wireless remote control (1)
Memory Stick (1)
Memory Stick/PC Card Adaptor (1)
User's manual (1)
Rechargeable battery pack NP-F550 (1)
Battery charger BC-V615 (1)
Neck strap belt BLT-10(H) (1)
PC Card/parallel port adaptor MSAC-PR1 (1)

Design and specifications are subject to change without notice.

Accessories (not supplied)

Memory Stick	MSA-4A (4MB), MSA-8A (8MB)
Memory Stick/PC Card kit	MSAKIT-PC4A
Semi-soft case	LCM-D700
AC adaptor/charger	AC-V700

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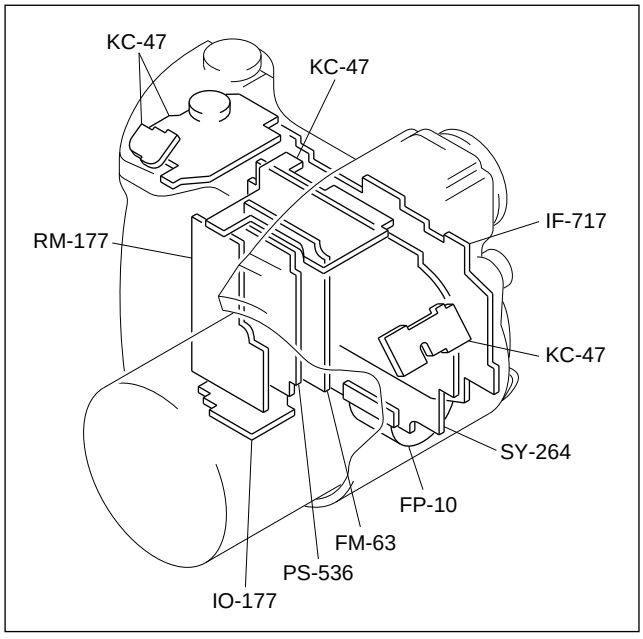
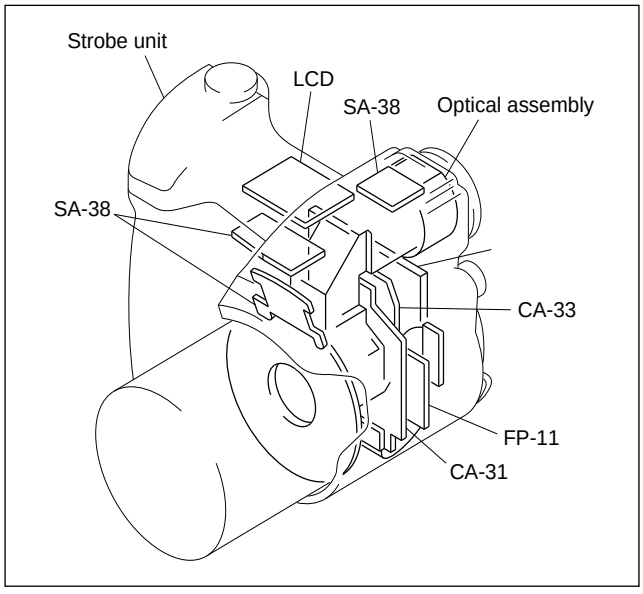
SECTION 2
SERVICE INFORMATION

2-1. MAJOR PARTS LOCATION

1.

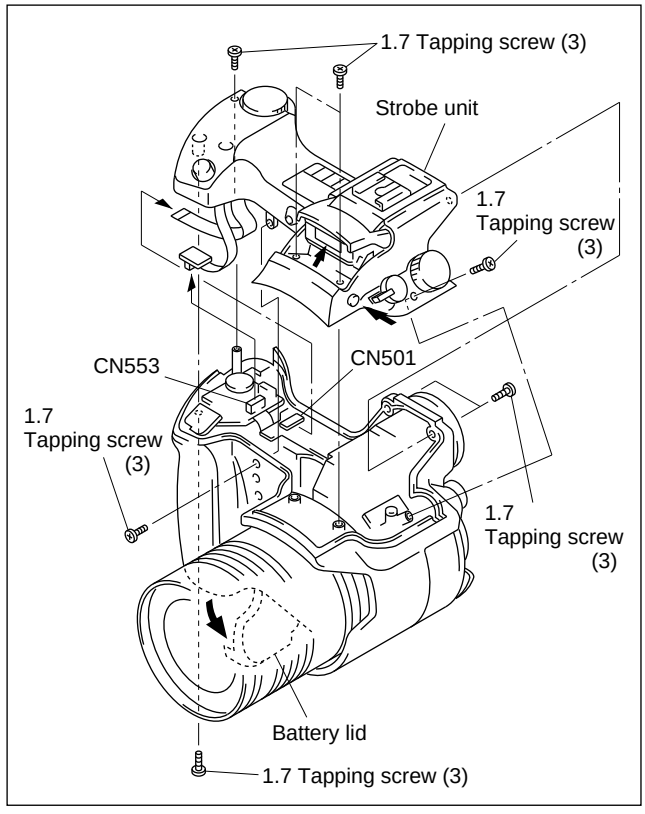


2.



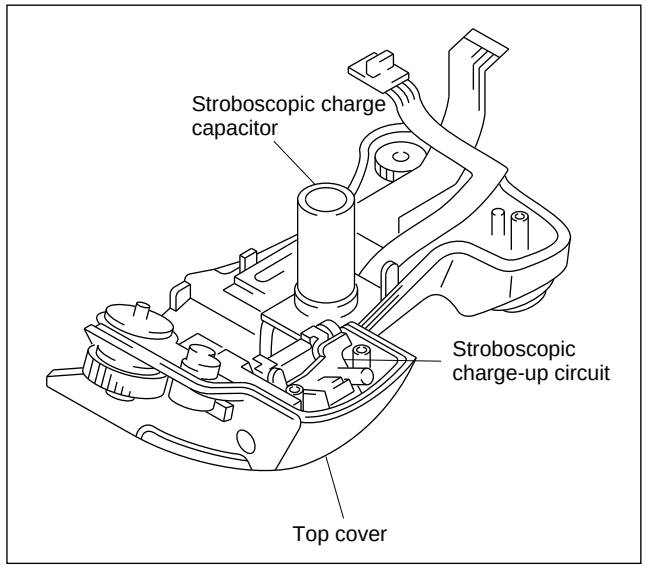
2-2. DISASSEMBLY

1. Removal of strobe unit (Top cover)

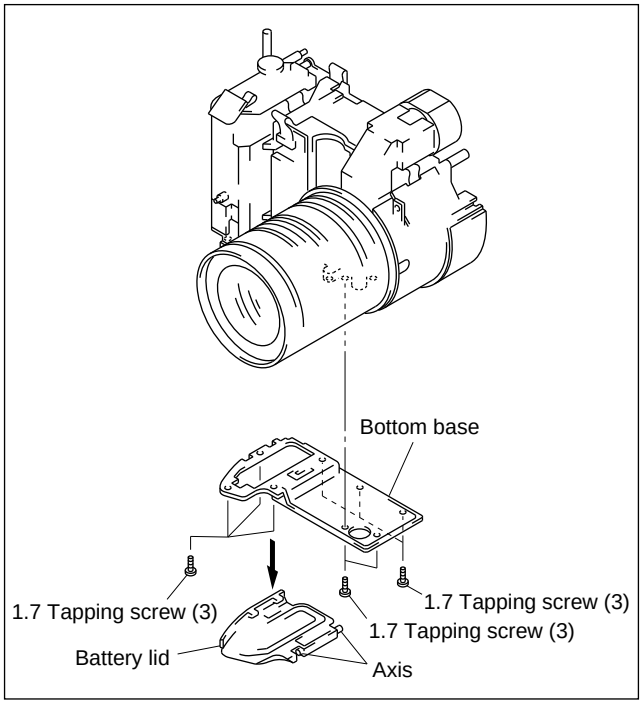


WARNING

Do not touch the terminal of a stroboscopic charge capacitor and the stroboscopic charge-up circuit with bare hands. This may cause an electric shock.



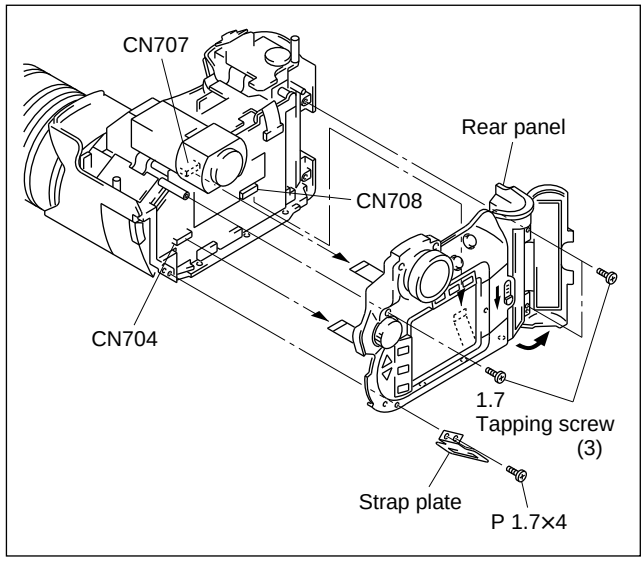
2. Removal of bottom base



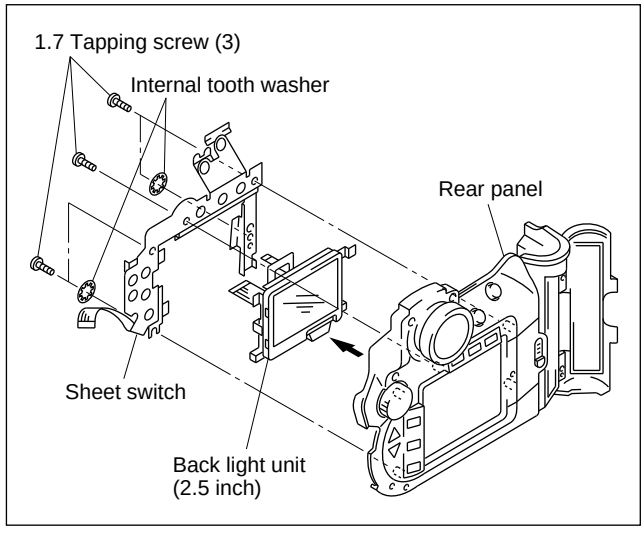
3. Removal of back light unit

Before removing rear panel, remove the bottom base.

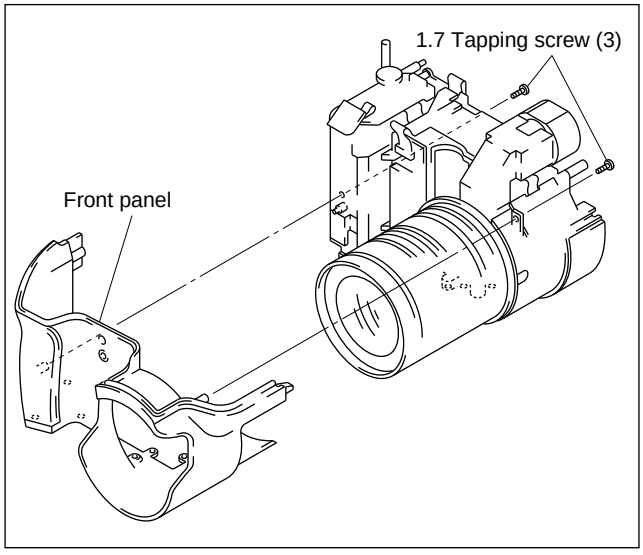
1.



2.

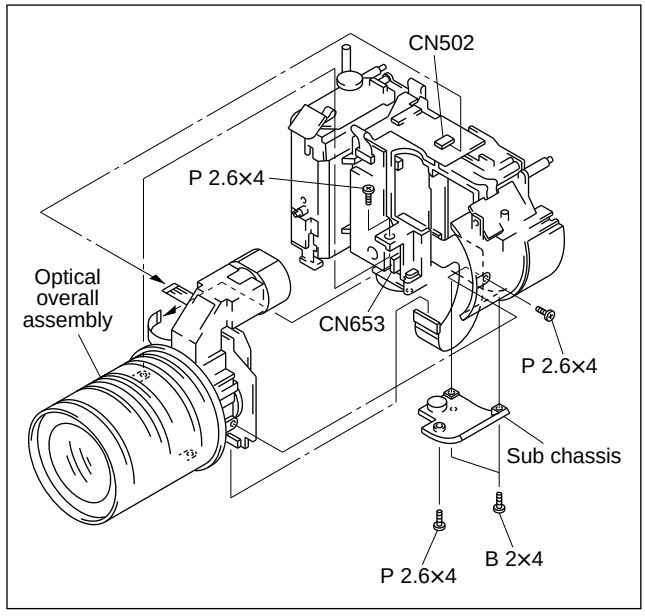


4. Removal of front panel

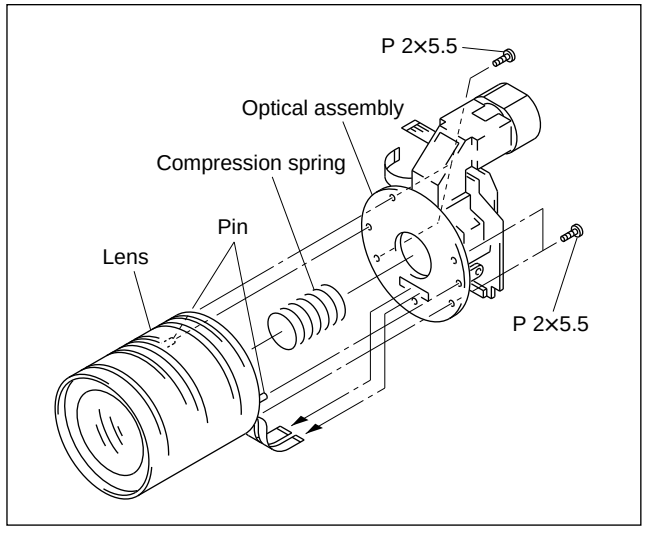


5. Removal of optical assy

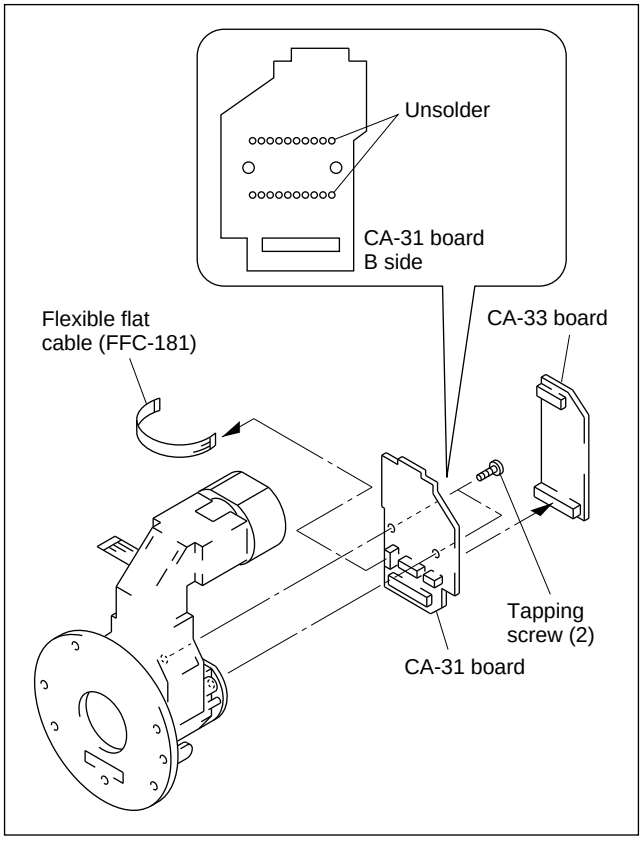
1.



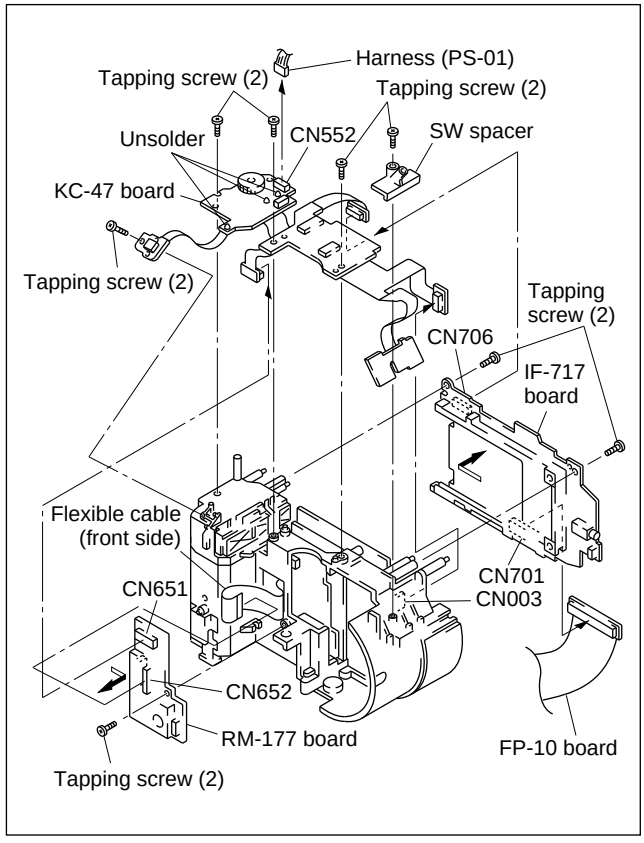
2.



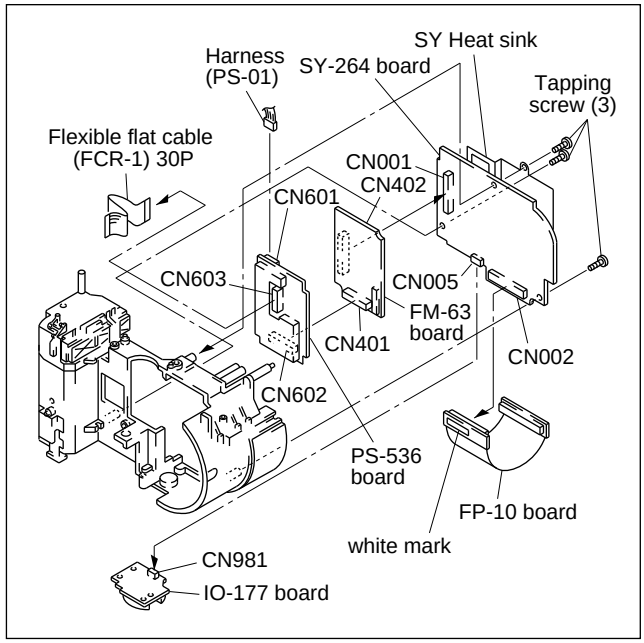
6. Removal of CA-31 and CA-33 boards



7. Removal of KC-47, IF-717 and RM-177 boards



8. Removal of SY-264, FM-63, PS-536, IO-177 and FP-10 boards



SECTION 3
ELECTRICAL ALIGNMENT

3-1. PREPARATION

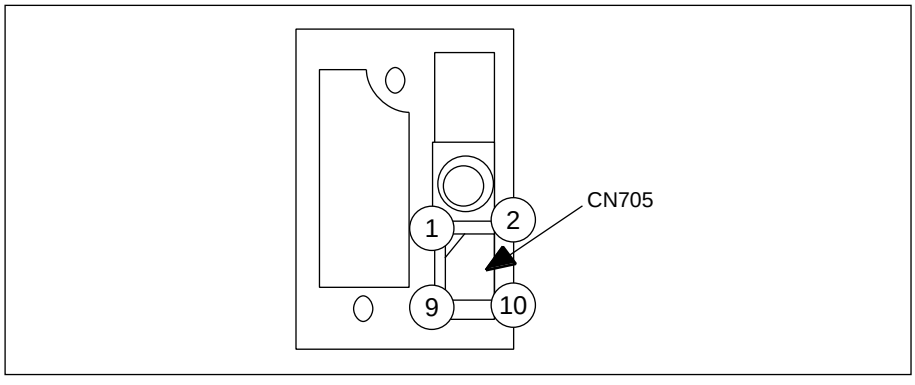
1. Equipment Required

- Chart for flange-back adjustment (Siemens star chart : J-6080-875-A)
- Pattern box (PTB-450 : J-6082-200-A)
- Optical filter (C14 : J-6080-058-A)
- Digital volt meter
- Oscilloscope (100 MHz or more)
- Vectorscope
- Monitor

2. Preparation for adjustment (1)

- When replacing the IF-717 board, open the jack cover below the mode dial with the VIDEO OUT jack of this camera, turn the two screws fixing the black cover plate, and remove the cover plate. There is 10-pin connector CN705 on the IF-717 board. Output signals of each connector pin are as follows.

CN705 connector	Signal name at measured pins of CN705
Pin 6	PSIG signal
Pin 7	PLL (RPD) signal
Pin 8	GREEN OUT signal
Pin 9	COM signal
Pin 10	Analog GND (There is no problem in the metallic part of the unit during grounding.)



- To extract an external VIDEO OUT signal from the unit, insert a video connection cord into the VIDEO OUT pin and measure the 75-ohm termination output. (The termination output can also be measured via a monitor.)
- Standard signals for adjustments

  100 % color-bar signal (The color-bar signal must be 100 % in a 219 digital level.)

  50 % full-white signal

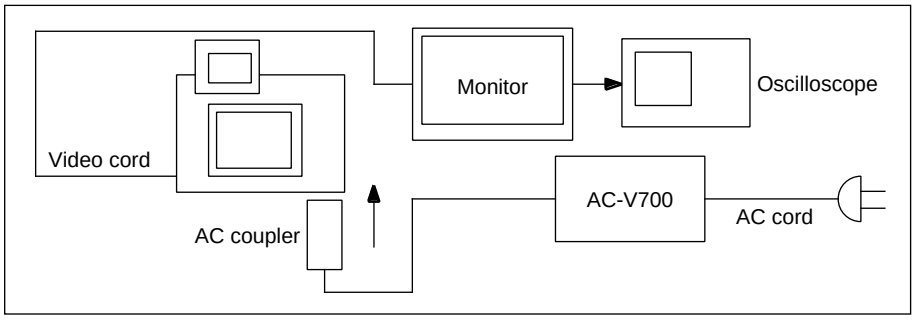
  100 % ramp signal

  Above signals are generated from internal memory by entering the camera test mode described later.

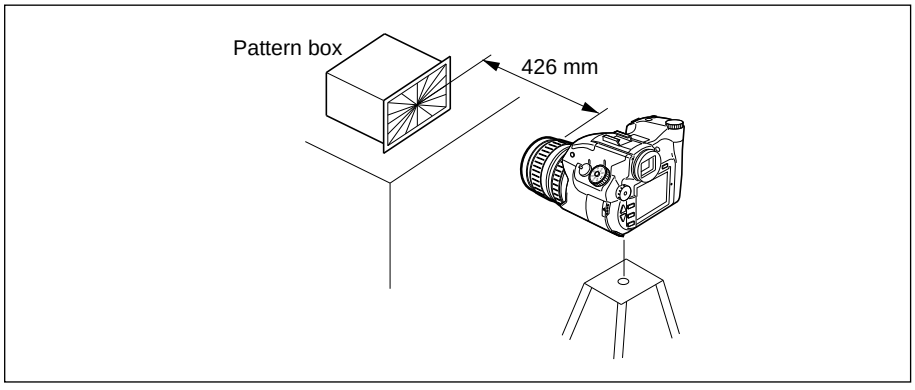
3. Power connection method

Insert an AC coupler into the battery holder of the unit using recommended AC adaptor AC-V700 and supply the power from the AC adaptor.

1. IF-717 board adjustment



2. Camera system adjustment



4. Entering the camera test mode

1. Set the camera power switch to the CAM mode.
2. Set the LCD button to ON.
3. Press the MENU button.
4. Press the AE-LOCK button.
5. Press the release button.
6. Press the EXECUTE button to display a DBG MENU item on the 2.5-inch LCD screen while pressing the ▽ (DOWN) button.
7. The red-displayed item in the menu is a currently selected item. The item can be selected using the ▽ and △ buttons. To change the contents of the selected item, press the EXECUTE button and select the item as required. To cancel the item selection, press the EXIT button.

5. Exiting the camera test mode

1. To exit the test mode with the DBG MENU item displayed on the 2.5-inch LCD screen, press the EXIT button several times until all menu items disappear on the LCD display.
2. When the adjustment test mode is exited, set the power switch to OFF to enter the factory-setting state.

Note

In this test mode, the register setting of a microcomputer in a camera is changed directly. Therefore, the camera may not properly operate when ones other than the specified item are changed incorrectly. The operations except items described on this manual are not performed absolutely.

3-2. CAMERA SYSTEM ADJUSTMENT (CA-31 AND CA-33 BOARDS)

This adjustment should be performed after following items is done.

- Replacement of CA-31 board or its mounted part
- Replacement of CA-33 board or its mounted part
- Replacement of overall optical block
- Replacement of lens

Basically, a camera is adjusted automatically. (The zooming must be partially performed by manual operation.)
Put the unit into the CAM_TEST mode while referring to how to enter the camera test mode in the 2-2 item. In this mode, the automatic camera adjustment is carried out by operating the △ (UP), ▽ (DOWN), and EXECUTE buttons.

Display of CAM TEST

Page	Func	Data		
00	00	0000	EXEC	
0000	0000	0000	0000	0000
0000	0000	0000	0000	0000

△ (UP) : Increases the page, function, and data of a register.
(*) The routine set to Page and Func is automatically executed when the EXECUTE button is selected.

▽ (DOWN) : Decreases the page, function, and data of a register.
(*) The routine set to Page and Func is automatically executed when the EXECUTE button is selected.

EXECUTE : Changes the selection block (in which characters become red).
(Changes it in the order of page, function, data, and execute.)

After set to the register below using the buttons above, the corresponding automatic adjustment is executed when the △ (UP) and ▽ (DOWN) keys are pressed with the EXECUTE button selected.

1. All Preset

All camera system register is preset by this operation.

p00 f00 d0001 EXECUTE

1) Set Page to 0.
2) Set Function to 0.
3) Set Data to 0.
4) Execute.

2. Focus (Zoom Tracking) Adjustment

Perform the focus adjustment in the procedure (steps 1 to 4) below.

Subject: Chart for flange-back adjustment (Siemens star chart : reflection type)
Place the chart 426 mm away from the lens tip for wide-angle position.
Set the illuminance approximately 800 lux or so that shutter speed is 1/60 to 1/30 at F2.8.

1. Start of focus adjustment
   Inhibit the zoom tracking and detect the origin by this operation.
   p00 f00 d0010 EXECUTE
   1) Set Page to 0.
   2) Set Function to 0.
   3) Set Data to 10.
   4) Execute.
2. Wide-angle position adjustment
   Wide-angle standard position is measured by this operation.
   p00 f00 d0011 EXECUTE
   1) Put together white frame displayed on the screen with the center of siemens star chart. (telephoto position to wide-angle position)
   2) Set the zoom manually to the wide-angle position.
   3) Set Page to 0.
   4) Set Function to 0.
   5) Set Data to 11.
   6) Execute.
3. Telephoto position adjustment
   Telephoto standard point is measured by this operation.
   p00 f00 d0012 EXECUTE
   1) Set the zoom manually to the telephoto position.
   2) Set Page to 0.
   3) Set Function to 0.
   4) Set Data to 12.
   5) Execute.
4. Completion of focus adjustment
   Store the adjustment result in EEPROM.
   Permit the zoom tracking.
   p00 f00 d0013 EXECUTE
   1) Set Page to 0.
   2) Set Function to 0.
   3) Set Data to 13.
   4) Execute.

3. Iris Adjustment

Subject: Not required.

1) Iris adjustment
   Threshold value of iris reset output voltage is measured by this operation.
   p00 f00 d0014 EXECUTE
   1) Set Page to 0.
   2) Set Function to 0.
   3) Set Data to 14.
   4) Execute.

4. AE Adjustment

Subject: Clear chart in pattern box

1) 0 dB adjustment

   Gain standard value is adjusted by this operation.

   p00 f00 d0018 EXECUTE

   1) Set Page to 0.
   2) Set Function to 0.
   3) Set Data to 18.
   4) Execute.

5. White Balance Adjustment

Subject: Clear chart in pattern box

1) Indoor adjustment

   (light source is 3200 k.)

   p00 f00 d0019 EXECUTE

   1) Set Page to 0.
   2) Set Function to 0.
   3) Set Data to 19.
   4) Execute.

2) Outdoor adjustment

   1) Attach an optical filter (C14) to the lens in order to change light source at 5600 k.

   p00 f00 d001A EXECUTE

   2) Set Page to 0.
   3) Set Function to 0.
   4) Set Data to 1A.
   5) Execute.

3) Internal flash's white balance adjustment

   • Subject: Reflection-type, full-white subject

   1) Pop up the internal flash.

   p00 f00 d001B EXECUTE

   2) Set Page to 0.
   3) Set Function to 0.
   4) Set Data to 1B.
   5) Execute.

6. Confirmation of Adjustment Error

Confirm the values of item 1 through 5.

1) Set Page to 0.
2) Set Function to 7.
3) Set Data to 6.
4) Check two positions of right lower on the numbers of picture lower.

0000	0000	0000	0000	0000	
0000	0000	0000	0000	0000	
			↓	↓	
			0000	0000	If it is all right.
			or		
			0062		

If necessory, repeat items 1 through 5.

3-3. SY-264 BOARD

(1) Upgrading of system microcomputer

The system microcomputer is upgraded to the latest version.

For more details, refer to the “3-7. Upgrading the Microcomputer”.

(2) Timer setting

The date and time are set by the menu operation.

3-4. FM-63 BOARD

Machine condition for adjustment	Specifications	Adjustments
1) Video oscillating frequency adjustment Equipment: Oscilloscope and frequency counter	1) Open the “DBG MENU” of camera test mode item. 2) Select “D/A CONVERTER” from the “DBG MENU” item using the ▽ (DOWN) button and press the EXECUTE button. The “D/A CONVERTER” menu is then displayed. 3) Select “FMC OSC” from the “D/A CONVERTER” menu using the ▽ (DOWN) button and press the EXECUTE button. 4) Observe the clock signal at pin 4 of IC410 and adjust using the △ (UP) and ▽ (DOWN) buttons so that the specifications below are satisfied. **Specifications: 24.545451 MHz ±50 Hz (NTSC)** **24.375000 MHz ±50 Hz (PAL)** ∗ The signal at an observation point must be extracted using a jumper wire. 5) Press the EXECUTE button. 6) Press the EXIT button three times to exit the menu.	
2) Camera PLL adjustment Equipment: Digital voltmeter	1) Open the “DBG MENU” of camera test mode item. 2) Select “D/A CONVERTER” from the “DBG MENU” item using the ▽ (DOWN) button and press the EXECUTE button. The “D/A CONVERTER” menu is then displayed. 3) Select “FMC PLL” from the “D/A CONVERTER” menu using the ▽ (DOWN) button and press the EXECUTE button. 4) Observe the error voltage at pin 7 of IC413 and adjust using the △ (UP) and ▽ (DOWN) buttons so that the specifications below are satisfied. **Specifications: 2.5 ±0.1 VDC** ∗ The signal at an observation point must be extracted using a jumper wire. 5) Press the EXECUTE button. 6) Press the EXIT button three times to exit the menu.	

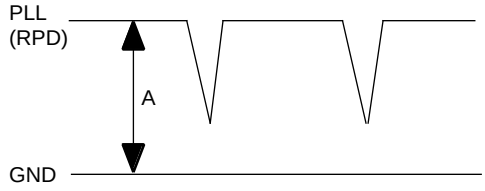
3-5. IF-717 BOARD

Be sure to execute “3-6-2. Factory Setting” before performing this adjustment.

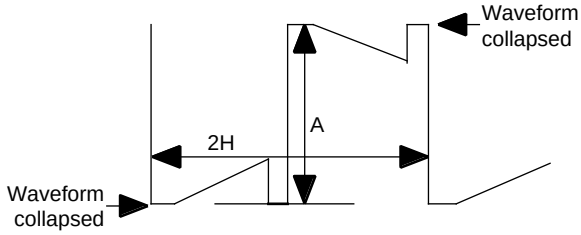
1. Output VIDEO OUT adjustment

Machine condition for adjustment	Specifications	Adjustments
Equipment: Oscilloscope and Vectorscope Mode: 100 % color bar		
1. Adjustment of Y and sync levels 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display COLOR BAR H in red. Press the EXECUTE button twice to display a color-bar image. 3) Press the EXIT button once to display a DBG MENU item.	1) Extract a video signal from the VIDEO OUT pin and observe the waveform using an oscilloscope. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display the Y level in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. **Y level 714 mV** **Sync level 286 mV** →After adjustment, press the EXECUTE button to define the data (with the Y level displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state.	◓ J 701 Y Level EVR
2. C level adjustment 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display COLOR BAR H in red. Press the EXECUTE button twice to display a color-bar image. 3) Press the EXIT button once to display a DBG MENU item.	1) Extract a video signal from the VIDEO OUT pin and observe the waveform using an oscilloscope. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display the C level in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. **Burst level 286 mV (NTSC)** **300 mV (PAL)** →After adjustment, press the EXECUTE button to define the data (with the C level displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state.	◓ J 701 C Level EVR

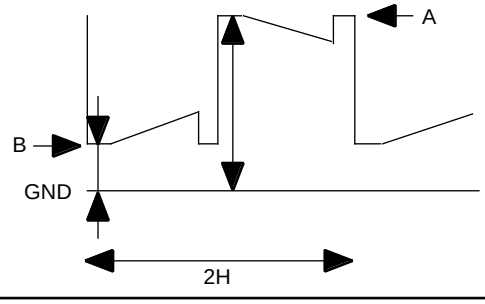
2. VCO adjustment

Machine condition for adjustment	Specifications	Adjustments
Equipment: Oscilloscope Mode: 100 % ramp image 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display RAMP H in red. Press the EXECUTE button twice to display a 100 % ramp image. 3) Press the EXIT button once to display a DBG MENU item.	CN705 7 Pin 1) Connect the camera to an oscilloscope and observe the waveform to confirm the PLL VCO (RPD) voltage output to the connector CN705 of the camera. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display VCO in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. →After adjustment, press the EXECUTE button to define the data (with VCO displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state. **A = 1.8 ±0.05 V**  	VCO EVR

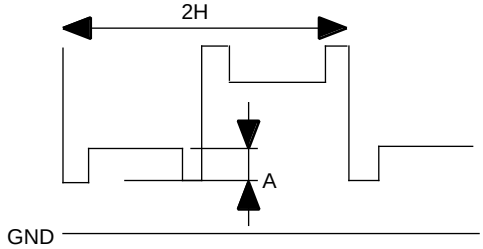
3. Maximum amplitude voltage adjustment on panel

Machine condition for adjustment	Specifications	Adjustments
Equipment: Oscilloscope Mode: 100 % ramp image 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display RAMP H in red. Press the EXECUTE button twice to display a 100 % ramp image. 3) Press the EXIT button once to display a DBG MENU item.	CN705 8 Pin 1) Connect the camera to an oscilloscope and observe the waveform to confirm the G-channel voltage output to the connector CN705 of the camera. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display BLANK LIMIT in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. →After adjustment, press the EXECUTE button to define the data (with BLANK LIMIT displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state. **Maximum amplitude voltage of waveform** **A = 8.0 ±0.1 Vp-p**  	BLANK LIMIT EVR

4. Signal center value adjustment

Machine condition for adjustment	Specifications	Adjustments
Equipment: Oscilloscope Mode: 100 % ramp image 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display RAMP H in red. Press the EXECUTE button twice to display a 100 % ramp image. 3) Press the EXIT button once to display a DBG MENU item.	CN705 8 Pin 1) Connect the camera to an oscilloscope and observe the waveform to confirm the G-channel voltage output to the connector CN705 of the camera. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display SIGNAL CENTER in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. →After adjustment, press the EXECUTE button to define the data (with SIGNAL CENTER displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state. **Maximum DC voltage of waveform A = 10.0 ±0.1 DVC** **Minimum DC voltage of waveform B = 2.0 ±0.1 DVC**  	SIGNAL CENTER EVR

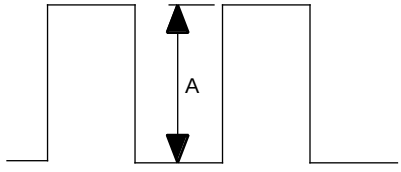
5. Contrast adjustment

Machine condition for adjustment	Specifications	Adjustments
Equipment: Oscilloscope Mode: 50 % full-white signal 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display WHITE FIELD in red. Press the EXECUTE button twice to display a 50 % full-white waveform image. 3) Press the EXIT button once to display a DBG MENU item.	CN705 8 Pin 1) Connect the camera to an oscilloscope and observe the waveform to confirm the G-channel voltage output to the connector CN705 of the camera. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display CONTRAST in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. →After adjustment, press the EXECUTE button to define the data (with CONTRAST displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state. **A = 1.9 ±0.05 Vp-p**  	CONTRAST EVR

6. VCOM voltage adjustment

Machine condition for adjustment	Specifications	Adjustments
Equipment: Oscilloscope Mode: 100 % ramp image 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display RAMP H in red. Press the EXECUTE button twice to display a 100 % ramp image. 3) Press the EXIT button once to display a DBG MENU item.	CN705 9 Pin 1) Connect the camera to an oscilloscope and observe the waveform to confirm the voltage at the VCOM pin output to the connector CN705 of the camera. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display VCOM in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. →After adjustment, press the EXECUTE button to define the data (with VCOM displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state. **VCOM voltage 5.5 ±0.1 V**	VCOM EVR

7. PSIG signal adjustment

Machine condition for adjustment	Specifications	Adjustments
Equipment: Oscilloscope Mode: 100 % ramp image 1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display RAMP H in red. Press the EXECUTE button twice to display a 100 % ramp image. 3) Press the EXIT button once to display a DBG MENU item.	CN705 6 Pin 1) Connect the camera to an oscilloscope and observe the waveform to confirm the voltage at the PSIG pin output to the connector CN705 of the camera. 2) Display the D/A CONV item in a DBG MENU item in red and press the EXECUTE button once. 3) Display PSIG-BRT in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. →After adjustment, press the EXECUTE button to define the data (with PSIG-BRT displayed in red). 4) Press the EXIT button once and return to the DBG MENU item state. **PSIG waveform amplitude A = 5.0 ±0.1 Vp-p**  	PSIG-BRT EVR

8. White balance adjustment

Machine condition for adjustment	Specifications	Adjustments
	1) Display the LCD DRIVER item in a DBG MENU item in red and press the EXECUTE button once. 2) Display R-BRIGHT in red, select the item, and press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. Moreover, display B-BRIGHT in red, select the item, and press the press the EXECUTE button. Shift the value using the △ and ▽ buttons and adjust it to the proper value. The specifications are as described below. **R-BRIGHT : 84H** **B-BRIGHT : 77H** →After adjustment, press the EXECUTE button to define the data. 3) Press the EXIT button once and return to the DBG MENU item state.	R-BRIGHT EVR B-BRIGHT EVR

9. Storage of adjustment register value

Machine condition for adjustment	Specifications	Adjustments
Store the set value of an electronic volume in EEPROM when all adjustments above have been completed.	1) Enter the camera test mode as described in the preparation for adjustment. 2) Select the EEPROM SET item with the DBG MENU item displayed on the 2.5-inch LCD screen and press the EXECUTE button once. 3) EEPROM SET MENU is displayed. Select the DA CONV SET from the EEPROM SET MENU and press the EXECUTE button. 4) Select the LCD SET from EEPROM SET MENU and press the EXECUTE button. 5) Press the EXIT button twice to exit the camera test mode.	

10. Color-bar screen check

Machine condition for adjustment	Specifications	Adjustments
1) Enter the camera test mode as described in preparation for adjustment. 2) Select the TEST CHART item with the DBG MENU item displayed on the 2.5-inch LCD screen and display COLOR BAR H in red. Press the EXECUTE button twice to display a 100 % color-bar image. 3) Press the EXIT button twice to exit a DBG MENU item.	• Display a color-bar image on the 2.5-inch liquid-crystal display screen and monitor. • No abnormality must exist in the display of a color-bar signal on the liquid-crystal display screen. No flicker, unvenness of hue, fog and beat.	

11. Inspection and correction after adjustment

After the SY-264, FM-63, and IF-717 boards are adjusted, inspect as described below.

1. Operation confirmation of operation buttons and switches
   Confirm the operation of operation buttons and switches in the procedure below when the top cover, rear panel, and front panel are removed.

   1) Open “DBG MENU”.
   2) Select “KEY_TEST2” from “DBG MENU” using the [▽] (DOWN) button and press the [EXECUTE] button. The “KEY_TEST2” screen is then displayed.
   3) Operate all turnover-indicated buttons and switches and turn off the turnover indication. If there is a button or switch whose turnover indication does not disappear, assemble the cover or panel again.
      ∗ “UPPR” → [△] (UP) button, “LOWR” → [▽] (DOWN) button
      “AELC” → AE-LOCK button, “RREV” → [REVIEW] button
      “CAN” → [EXIT] button, “MODE” → Mode dial, “EV” → [+/−] button
      “SFTD” → Shift dial, “TOCH” → Half-pressed [release] button
      “RELE” → Fully-pressed [release] button, “AF/M” → AF/MF selection switch
      “POPU” → POP-UP key, “POWR” → Power dial
   4) Remove the battery and turn off the power forcibly.
      The power cannot be turned off by power dial operation.

2. General operation confirmation
   Perform the operation confirmation below.

   1) Confirm that the automatic and manual focus operations are normal during shooting.
   2) Shoot a proper object in each mode where the QUALITY mode is “S” and “M” and confirm that the recording of it on a card is completed normally.
   3) Reproduce the recorded image shot in step 2) and confirm that the image on the LCD monitor and the video output image are normal.

3. Factory setting
   Return to the factory setting as required. (Refer to “3-6, Service Mode”.)

3-6. SERVICE MODE

1. Camera test mode

For the board adjustment and microcomputer upgrading, open “DBG MENU” of camera test mode and follow each procedure.
The “DBG MENU” can be opened in the procedure below.

(1) Press the MENU button.
(2) Press the AE-LOCK button once.
(3) Press the release button once.
(4) Press the EXECUTE button while pressing the ▽ (DOWN) button.

If a failure occurs, exit the menu once and repeat steps (1) and later.
The operations except items described on “DBG MENU” are not performed absolutely.
The camera may not properly operate when ones other than the specified item are changed incorrectly.

2. Factory setting

The contents of setting except the mode setting in a camera system can be returned to the factory setting in the procedure below.

(1) Set the power dial to PLAY with the card pulled out.
(2) Press the MENU button while pressing the SHIFT, SPOT, and release buttons.
(3) USER_FILE RESET is displayed.
(4) Press the EXECUTE button.

In the procedure described above, all user files, and DISP ON/OFF and LCD ON/OFF can be returned to the factory setting. The ID setting is also cleared.
The mode setting in a camera system can be returned to the factory setting in the procedure below.

(1) Set the mode dial to USER.
(2) Turn the shift dial while pressing the SHIFT button and select “No.0 (reset)”.
(3) Release the SHIFT button.

3-7. UPGRADING THE MICROCOMPUTER

1. Upgrading the system microcomputer
   (1) Upgrading
      1) Insert a battery in the full-charge state and set the power dial to PLAY. Use a battery as far as possible to prevent the power from being turned off instantaneously during upgrading. At that time, never use batteries other than lithium.
      2) Press the MENU button to display "PLAY MENU".
      3) Press the AE-LOCK button once.
      4) Press the release button once.
      5) Press the EXECUTE button once while pressing the ▽ (DOWN) button.
      6) Release each button and confirm that "DBG MENU" is displayed.
         If "DBG MENU" is not displayed, press the EXIT button twice to exit the menu and repeat steps 2) and later.
         Do not press the different button in steps 2) to 5) or press the button twice. You cannot enter "DBG MENU" in this case.
      7) Select "VERSION" from "DBG MENU" using the ▽ (DOWN) button and press the EXECUTE button. Confirm that the "VERSION" menu is displayed.
      8) Confirm the version number of a "SYC:" item in the "VERSION" menu. Confirm that the current version is older than the new version to be upgraded.
      9) Select "safety: READ ONLY" from the "VERSION" menu using the ▽ (DOWN) button and press the EXECUTE button to enter "safety: UPDATE".
      10) Select "SYC:" using the ▽ (DOWN) button and press the EXECUTE button.
      11) The file list in a card is displayed. Select the upgrading file copied in step 1) from this list and press the EXECUTE button.
      12) After the "Loading File" message, the "Update Flash Memory OK?" message is displayed. If the displayed version number is correct, press the EXECUTE button.
      13) The upgrading is completed if the system microcomputer is reset approximately one minute after the "Now Version Up DON'T TOUCH" message is displayed and if the normal playback state in which "DBG MENU" disappears is entered.
         During upgrading in step 13), do not press the buttons of the unit or turn off the power.
         If the system microcomputer is hung up with the message during upgrading displayed, wait five minutes or more and set the power dial to OFF. Pull out the battery once and then turn on the power again.
         Replace IC012 on the SY-264 board when the upgrading fails and when the system microcomputer cannot operate again.
      14) Set the power dial to OFF.

(2) Confirmation of version

After upgrading is completed, be sure to confirm the version.

1) Open “DBG MENU” according to the procedure of 1) to 6) in step (1).
2) Select “VERSION” from “DBG MENU” using the ▽ (DOWN) button and press the EXECUTE button. Confirm that the “VERSION” menu is displayed.
3) Confirm the version number of a “SYC:” item in the “VERSION” menu.
4) Press the EXIT button three times to exit the menu.
5) Set the power dial to OFF.

(3) Preset of EEPROM

After upgrading is completed, be sure to preset the EEPROM.

1) Open “DBG MENU” according to the procedure of 1) to 6) in step (1).
2) Select “EEPROM SET” from “DBG MENU” using the ▽ (DOWN) button and press the EXECUTE button. Confirm that the “EEPROM SET” menu is displayed.
3) Select “SYSTEM RESET” using the ▽ (DOWN) button and press the EXECUTE button.
   Note: Never reset items other than “SYSTEM RESET”.
4) Press the EXIT button three times to exit the menu.
5) Set the power dial to PLAY with the card pulled out.
6) Press the MENU button while pressing the SHIFT, SPOT, and release button.
7) USER_FILE RESET is displayed.
8) Press the EXECUTE button.
9) Set the power dial to OFF.

2. Upgrading the camera microcomputer

(1) Upgrading

1) Insert a battery in the full-charge state and set the power dial to CAM. Use a battery as far as possible to prevent the power from being turned off instantaneously during upgrading. At that time, never use batteries other than lithium.
2) Press the [MENU] button to display "CAMERA MENU".
3) Press the [AE-LOCK] button once.
4) Press the [release] button once.
5) Press the [EXECUTE] button once while pressing the [▽] (DOWN) button.
6) Release each button and confirm that "DBG MENU" is displayed. If "DBG MENU" is not displayed, press the [EXIT] button twice to exit the menu and repeat steps 2) and later.
   Do not press the different button in steps 2) to 5) or press the button twice. You cannot enter "DBG MENU" in this case.
7) Select "VERSION" from "DBG MENU" using the [▽] (DOWN) button and press the [EXECUTE] button. Confirm that the "VERSION" menu is displayed.
8) Confirm the version number of a "CAM:" item in the "VERSION" menu. Confirm that the current version is older than the new version to be upgraded.
9) Select "safety: READ ONLY" from the "VERSION" menu using the [▽] (DOWN) button and press the [EXECUTE] button to enter "safety: UPDATE".
10) Select "CAM:" using the [▽] (DOWN) button and press the [EXECUTE] button.
11) The file list in a card is displayed. Select the upgrading file copied in step 1) from this list and press the [EXECUTE] button.
12) After the "Loading File" message, the "Update Flash Memory OK?" message is displayed. If the displayed version number is correct, press the [EXECUTE] button.
13) The upgrading is completed if the camera microcomputer is reset approximately one minute after the "Now Version Up DON'T TOUCH" message is displayed and if a new version is displayed in the "CAM:" position. During upgrading in step 13), do not press the buttons of the unit or turn off the power.
    If the camera microcomputer is hung up with the message during upgrading displayed, wait five minutes or more and set the power dial to OFF. Pull out the battery once and then turn on the power again.

(2) Confirmation of version

After upgrading is completed, be sure to confirm the version.

1) Open "DBG MENU" according to the procedure of 1) to 6) in step (1).
2) Select "VERSION" from "DBG MENU" using the [▽] (DOWN) button and press the [EXECUTE] button. Confirm that the "VERSION" menu is displayed.
3) Confirm the version number of a "CAM:" item in the "VERSION" menu.
4) Press the [EXIT] button three times to exit the menu.
5) Set the power dial to OFF.

SECTION 4
CIRCUIT DESCRIPTION

4-1. OPERATION THEORY OF CCD

A CCD (Charge Coupled Device) image sensor consists of a regularly laid-out MOS (Metal-Oxide-Semiconductor) capacitor.
The MOS capacitor has three basic functions below that treat a charge.

1. Photoelectric Conversion (Photosensor)
   When incident light falls on the MOS capacitor, the charge is generated in proportion to the illumination received.

2. Charge Storage
   When a voltage is applied to the electrode of a MOS capacitor, a “potential well” is generated in the silicon layer. The charge is stored in this well.

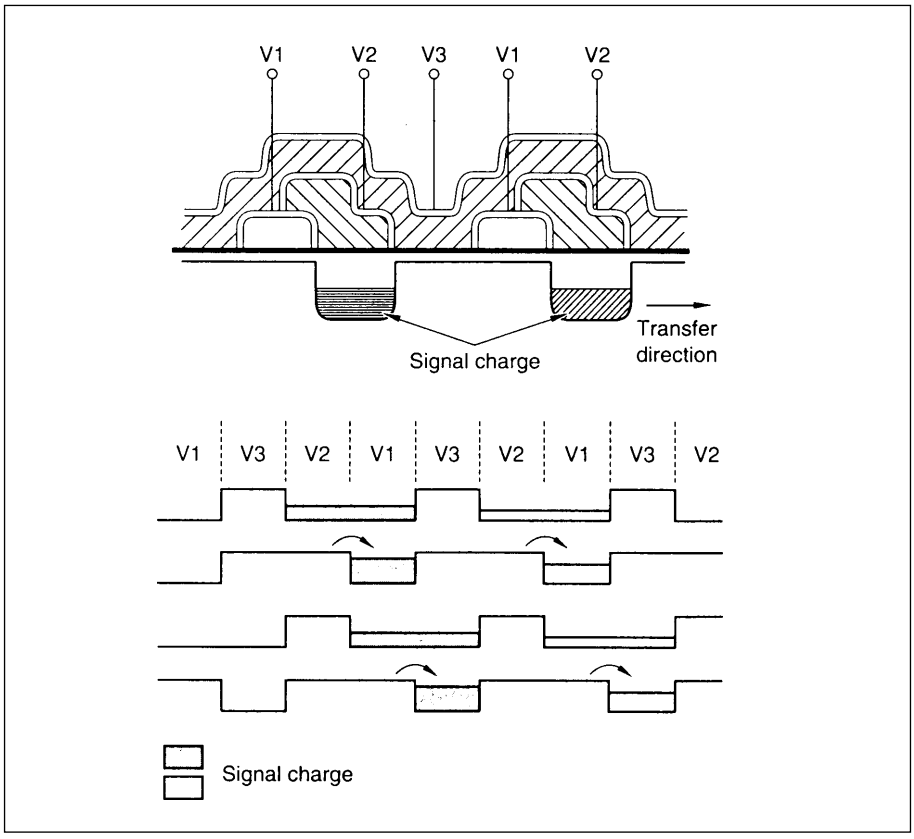
3. Charge Transfer
   When a higher voltage is applied to the electrode, a deeper well is generated. When a lower voltage is applied, a shallower well is generated.
   The charge is transferred using this characteristic. When a higher voltage is applied to the electrode, a deeper “potential well” is generated. The charges accumulated in an adjacent well flows into the “potential well”.
   When this operation is sequentially repeated in the regularly laid-out electrode, the charge is transferred from one MOS capacitor to another MOS capacitor. This is the theory of the CCD charge transfer.

4-2. MECHANISM OF CCD CHARGE TRANSFER

The all pixel simultaneous readout CCD used in this unit has the vertical CCD, horizontal CCD configured as shown below.

1. Vertical CCD : Using a 3-layered electrode 3-phase drive CCD structure, the unit reads out all pixels independently and transfer them in a one-field period. (Two vertical transfers are performed in one horizontal blanking period.)

   The CCD used in this unit reads out all pixels independently in a one-field period, so that it does not perform pixel mixing. For this reason, the CCD uses a three-layered electrode three-phase drive, and not a conventional two-layered electrode four-phase drive.
   Because the electrode is three-layered, load is higher than with the conventional structure, requiring a V driver with a greater drive capacity.



Flg. 1 Vertical Trasfer

2. Horizontal CCD :

The horizontal transfer section uses a two-phase drive to transfer charges.

Fig. 2 shows a well of potential at each time.

The status at time t_1 is such that electrode voltage is H1 > H2 therefore, the electrode of H1with higher potential has a deep well, and charges are stored in this deep well.

The status at time t_2 is such that the H1 and H2 voltage relationships are reversed therefore, the well for H2 is deeper than that of H1. Consequently, the signal charge flows into the H2 well that is deeper than that of H1. To see the status at t_3, we find that there is no change in electrode voltages therefore, the signal charge flows into the H2 well, thus completing a transfer of one charge.

This operation is repeated again and again until all charges are horizontal transferred.

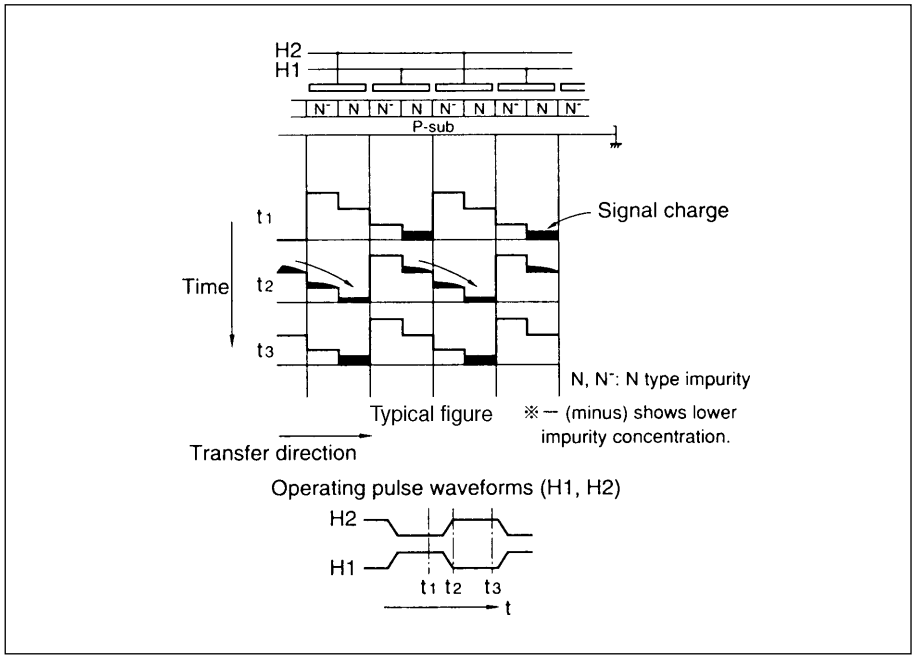


Fig. 2 Horizontal Transfer

CCD Imager

System	Progressive Scan CCD image sensor
Optical size	1/2 inches
Total number of pixels	Approx. 1,500,000 (1434 (H) × 1050 (V))
Number of effective pixels	Approx. 1,400,000 (1360 (H) × 1024 (V))

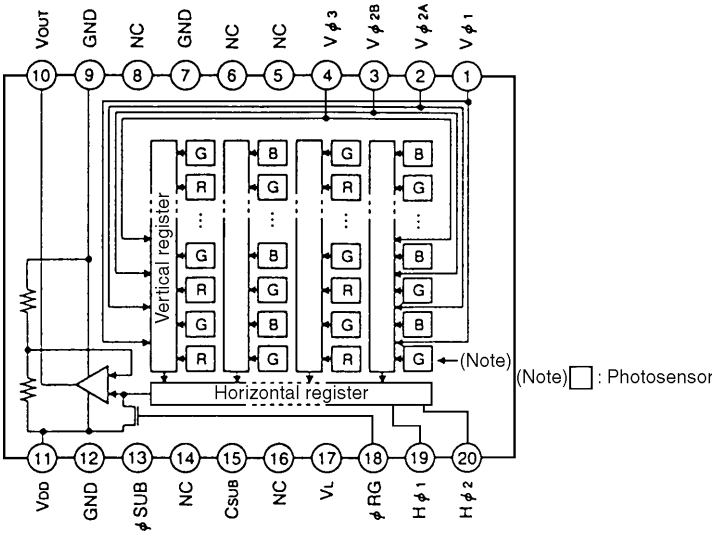


Fig. 3 Block Diagram and Pin Layout

3. Color coding and read-out system
   - Color coding

     For the CCD mounted in this unit, primary color filters are arranged according to the array (Bayer array) shown in the fig. 4.

     Gr and Gb indicate a G signal that is in the same line as R and B signals.

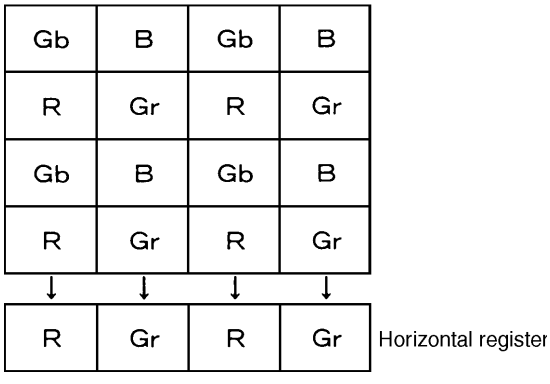


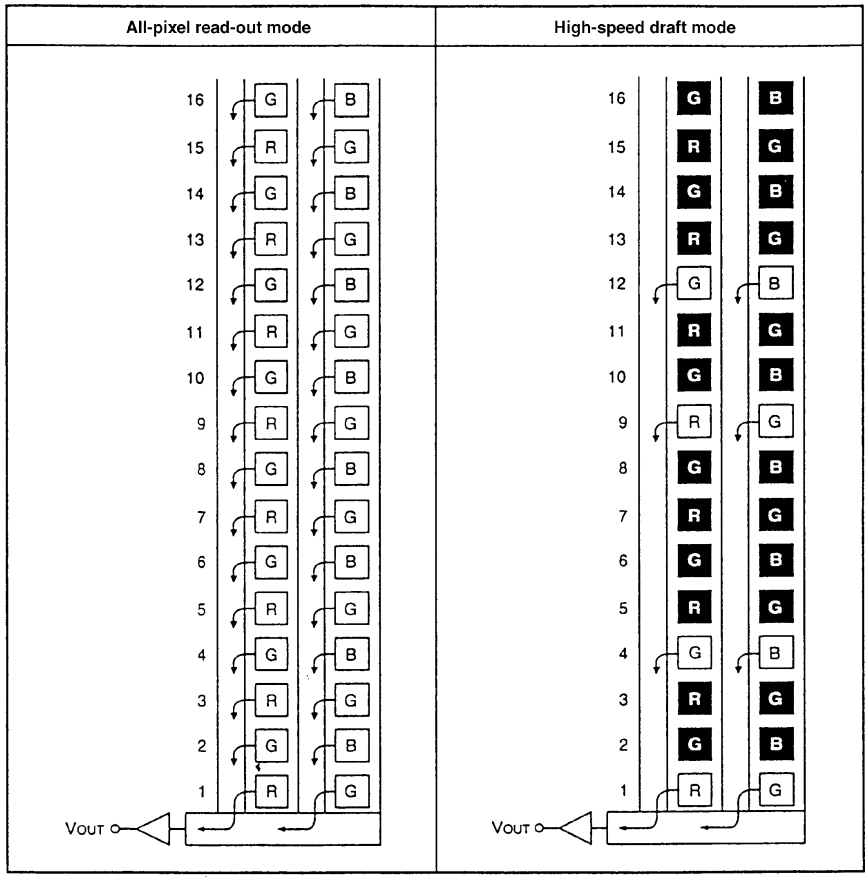
Fig. 4 Typical Drawing of Color Coding

• Read-out system

In this unit, each mode is properly used for a read-out system during monitoring and shooting as described below.

During monitoring, the decimation read-out mode is used to attach importance to the frame rate. During shooting, the all-pixel read-out mode is used to read out all pixels.

• Read-out mode



Note

The blackened portion in the figure indicates the pixel that is not read out. In the high-speed draft mode, a signal is output from the first line.

1) All-pixel read-out mode

In this mode, the signals of all pixels are output in 1/7.5 seconds by non-interlace operation.

The vertical resolution is approximately 800 TV lines. This mode is suitable for loading a high-resolution picture so as to read out the signals of all pixels simultaneously during identical exposure period.

2) High-speed draft mode

In this mode, the whole effective area is scanned in approximately 1/30 seconds by reading-out only the two-line signals (signals in the first and fourth lines, and in the ninth and twelve lines) in eight lines. The vertical resolution is approximately 200 TV lines.

This is the read-out mode in which importance is more attached to the processing rate than the vertical resolution.

4-3. CA-31 BOARD

The CA-31 board consists of the following.

- CCD and CCD's peripheral circuits
  IC204 CX205AK : PSCCD with 1,500,000 pixels
  IC201 CXD2460R : Timing generator for ICX205AK driving
- Analog sample-and-hold circuit and gain amplifier circuit
  IC205 CXA2096N : Camera head amplifier
  IC206 MB88347LPFV : D/A converter
- Digital 10-bit A/D converter and camera display
  IC202 ADS933 : 10-bit A/D converter
  IC203 CXD3135R : Camera signal processing display

The light passed through the camera lens and prism reaches the chip surface of IC204 (CCD) on the CA board and is converted into electric charges corresponding to the brightness of light using a photosensor of approximately 1,500,000 pixels. The converted charges are stored in the photosensor for the specified storage time and then read out to the transfer block. The electric charges that were sequentially sent to the transfer block are finally output to the output block of IC204 to produce an output signal as CCD.

- Timing generator
  IC201 (CXD2460R) generates various timing pulses required to drive CCD by inputting the CKI signal (29.670 MHz for NTSC and 24.750 MHz for PAL) from a system clock generator (on the FM-63 board) and the FRO and HRO signals output from a sync signal generator (IC203 CXD3135R).

  The timing pulses generated by IC201 are as follows:
  CL: 910 fH clock (1/2 of CK (1820 fH))
  H1 and H2: Clocks for driving the horizontal transfer block of a CCD imager
  V1 to V3: Clocks for driving the vertical transfer block of a CCD imager
  SUB: Charge sweep pulse for electronic shutter control
  RG: Reset gate pulse
  XSHP and XSHD: Sample-and-hold pulses for correlative double sampling
  WEN: Write enable pulse for low-speed shutter
  ADCLK: Sample-and-hold pulse for A/D converter
  XCPOB: Pulse for clamping the optical black block
  PBLK: Pre-blanking pulse
  XRS: Camera signal sample-and-hold pulse
  XCPDM: Pulse for clamping the CCD dummy bit block

- Camera head amplifier
  The CCD output signal from IC204 is input through buffer amplifier Q201 to the PIN and DIN pins of IC205 (CXA2096N). In IC201, the signal is reduced in noise by correlative double sampling and output to the later stage by a gain of approximately 6 dB. Moreover, the signal is clamped during CCD blank feeding and then input to the gain control amplifier. In this unit, the ISO sensitivity (100, 200, or 400) is altered by changing the voltage at the AGCCONT pin (to 1.5 V through 3.0 V) and controlling the gain.
  The signal is also clamped in an A/D sample-and-hold circuit and CCD black level block and then output from the DRVOUT pin to IC202 (ADS933) after the DC potential is replaced with a VRB voltage using a blanking switch.
  The DC offset of a DRVOUT signal is controlled by applying a voltage to the OFFSET pin.
  VRT and VRB voltages are supplied to the VRT and VRB pins of IC202 using a (10-bit A/D) reference voltage driver for IC202. (VRT = 2.4 V and VRB = 1.4 V)

- D/A converter
  The D/A converter converts the data signal from IC301 (HD64F3437TF16) on the CA-33 board by IC206 (MB88347LPFV) and produces an offset/AGC control signal.

- 10-bit A/D converter
  The signal from IC205 is converted into a 10-bit digital signal by IC202. The reference signal input for △Vref (VRT - VRB = approx. 1 V) is approximately 300 mV. A D range of 300 % is secured in this case.

- Camera signal processing display
  A 10-bit digital signal is input from IC202 to pins AD0 through AD9 and output from pins D0Y0 through D0Y7 and D0C0 through D0C7 to the FM-63 board according to the Y/UV 4:2:2 format. IC203 is controlled by the MCK clock from IC201, the XCAMHRO/XCAMFRO sync signal from the FM-63 board, and the serial control signal from a camera microcomputer on the CA-33 board.
  The major functions of IC203 are as follows:
  - Variable gamma circuit
  - Hue correction circuit
  - Contour correction circuit
  - AE/AWB detection circuit
  - Automatic CCD fault detection and correction circuit
  - Sync signal generator circuit (FRO, HRO, MFRO, and MHRO signals)

4-4. CA-33 BOARD

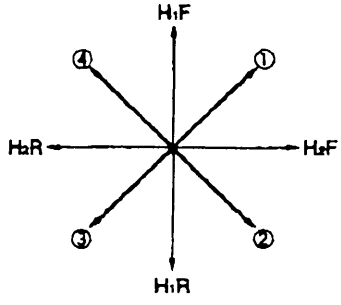
The CA-33 board consists of the following.
IC301 HD64F3437TF16 : Camera microcomputer
IC307 AK6440AF : 512-byte EEPROM
IC308 to IC310 uPD16818GS : Driver circuits for focus, iris, and shutter

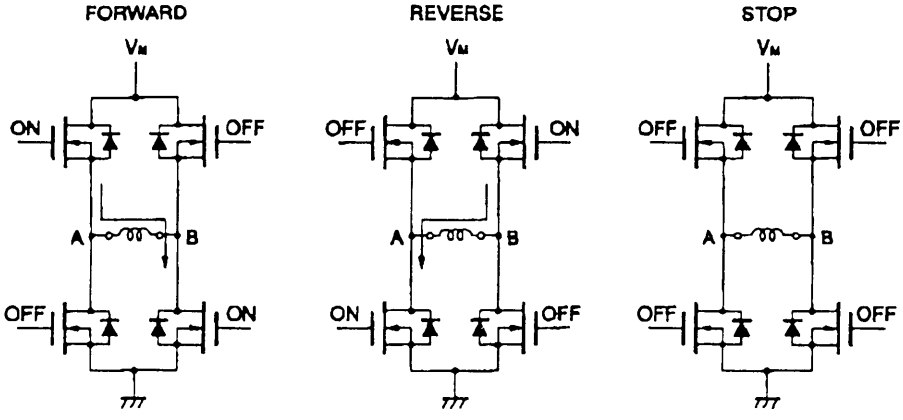
Microcomputer and its peripheral block
IC301 is an 8-bit microcomputer (HD64F3437TF16: Hitachi). IC301 functions as the main block of the CA-33 board and controls the whole camera control block. HD64F3437TF16 is an 8-bit single-chip microcomputer and has an internal flash memory of approximately 60 k bytes.
(The firmware in a camera system is upgraded by the rewrite operation.)
This microcomputer is connected to IC307 (EEPROM). The camera data is memorized from a microcomputer to this EEPROM so as to update data as required. Data is communicated in serial. IC201 (timing generator), IC203 (camera display), and IC206 (D/A converter) on the CA-31 board are all connected with the camera microcomputer and controlled by serial data.
IC308 to IC310 are driver circuits for a focus, iris, and shutter. They change the direction of excitation by controlling the IN1, IN2, and INC voltages at pins 8 to 10 using IC301 (microcomputer).
(For more details, refer to the function table below.)

Function table

Direction of excitation	INC	IN_1	IN_2	H_1	H_2
①	H	H	H	F	F
②	H	L	H	R	F
③	H	L	L	F	R
④	H	H	L	R	R
—	L	X	X	STOP	

F : FORWARD
R : REVERSE





4-5. FUNCTION DESCRIPTION OF FM-63 BOARD

Functional outline of FM-63 board

- During release, the input video signal from the camera display (IC203 on the CA-31 board) is passed through IC401 and directly written in frame memories IC404 and IC405 according to the YUV 4:2:2 format.

- During recording, the video data loaded into frame memories IC404 and IC405 is read in the order required for DCT operation in the compression REC mode and output to the JPEG coder (IC003 on the SY-264 board). In the non-compression REC mode, the data is converted from YC data to RGB data and output to CPU DRAMs (IC013 and IC014 on the SY-264 board).
  A thumbnail picture is produced in IC401 by reading video data from frame memories.

- During playback of the compressed picture, the video data input from a JPEG coder (IC003 on the SY-264 board) is output to frame memories IC404 and IC405 while it is returned to the former order. Next, the video data is read from the frame memories for size conversion and output video memory IC403. Simultaneously at that time, the signal format is converted from YUV 4:2:2 to 4:2:0.
  During playback of the non-compressed picture, the video data input from CPU DRAMs (IC013 and IC014 on the SY-264 board) is converted from RGB to YUV by IC401 and output to video memory IC403.
  The video data read from video memory IC403 is also input to encoder IC402 and output from IC402 in the form of an analog signal as an NTSC or PAL signal. Moreover, the recorded picture can also be rotated by changing the read direction of data from frame memories.

- In the EE mode of a camera signal, the input picture data from the camera display (IC203 on the CA-31 board) is written in video memory IC403 via the picture size conversion filter in IC401.
  Next, the video data read from video memory IC403 is input to encoder IC402 and output from IC402 in the form of an analog signal as an NTSC or PAL signal.
  The frame rate of the input and output pictures in this video memory is 1:1 (30 frames per second for NTSC and 25 frames per second for PAL).

Function description of main blocks

- Frame memory block (IC401, IC404, and IC405)
  The frame memory consists of two 16M-byte DRAMs (IC404 and IC405). This frame memory is controlled by the FA0 to FA9 (186-195), FRAS (179), FCAS1 (180), FCAS2 (181), FWE (184), and FOE (185) signals output from IC401. During release, video data of 1344 × 1024 or 640 × 480 pixels is written according to the YUV 4:2:2 format.

- Video memory block (IC403 and IC405)
  The video memory is 4M-byte VRAM (IC403). This video memory is controlled by the VA0 to VA8 (42-50), VWE (57), VRAS (54), VCAS (55), and XVTRIG (76) signals output from IC401. However, the read address of the VRAM SAM port is controlled from the encoder by the serial communication (SDATA, SCLK, ADRQ, and ADAK) between IC401 and IC402 (encoder).
  Video data of 640 × 480 pixels is written in this VRAM according to the YUV 4: 2:0 format. Moreover, the character data stored in the buffer inside IC401 from CPU is written in this VRAM during horizontal or vertical blanking period at which no video data has been input.

- Encoder block (IC402)
  The encoder is constituted by IC402. The YUV signal input from DRAM IC403 is encoded to an NTSC or PAL signal by digital processing and output through a D/A converter as the Y and C signals contained in an analog signal. At that time, the PAL signal converts the number of lines according to the picture size of 640 × 480 pixels and produces 640 × 570 pixels.
  The character data read from VRAM IC403 is mixed with video data using this encoder.

- Camera/video signal generator block (IC410 to IC416, and IC420 to IC423)
  An oscillator circuit constituted by IC411 uses a reference video clock (24.545 MHz for NTSC and 24.375 MHz for PAL). A PLL circuit is constituted by IC412 to IC416 so as to synchronize a camera clock (29.670 MHz for NTSC and 24.750 MHz for PAL) with the reference video clock. In the PLL circuit, a frequency-division circuit and a phase comparator are incorporated into IC401.

4-6. FUNCTION DESCRIPTION OF SY-264 BOARD

Functional outline of SY-264 board

- The SY-264 board mounts a system control block with main microcomputer IC001 in the center, a compression/expansion processing block consisting of frame memory IC401 (on the FM-63 board) and JPEG coder IC003 that inputs and outputs video data, and a card interface processing block.

Function description of main blocks

- CPU block (IC001 and IC008)
  The CPU block uses a 32-bit single-chip RISC microcomputer (SH-2) as main microcomputer IC001 and controls the whole system. IC008 is a voltage detector of 2.7 V. The detected output signal is combined with the SH reset signal from a key/LCD control microcomputer (IC501 on the KC-47 board) by IC009 and input to the reset pin (108) of IC001.

- CPU peripheral block (IC011 to IC014, and IC002)
  The CPU peripheral block consists of 4M-byte flash ROM (IC012), 16M-byte DRAMs (IC013 and IC014), 64k-byte EEPROM (IC011), and a peripheral device control circuit (IC002).
  The peripheral device control circuit (IC002) consists of the following; a CPU interface block (D0-D15, A1-A14, A21, interrupt INT (193), WAIT (194), and control pulses), a JPEG control block (JA1-JA10, JCS (96), JRD (97), JWR (98), JRQ (99), and JAK (100)), a key/LCD control microcomputer (IC501 on the KC-47 board) interface block, a camera microcomputer (IC301 on the CA-33 board) interface block, a card control block (CD0-CD15, CA0-CA10, CWE (11), COE (10), CCE1 (8), and CCE2 (9)), and a battery check control block (TXBAT (145) and RXBAT (144)).

- JPEG block (IC003 and IC002)
  During compression, the video data that is output from a frame memory controller (IC401 on the FM-63 board) and read from DRAMs (IC404 and IC405 on the FM-63 board) is input to the pins (PIXEL4 through PIXEL11) of JPEG coder IC003. At that time, the video data is divided into the 8-by-8 (8 × 8)-pixel block of Y, Cb, and Cr and input to IC003 in the order of YYCbCr.
  The compressed data is input to DRAMs IC013 and IC014 by the DMA data transfer between the JPEG coder (IC003) and DRAMs (IC013 and IC014).
  During expansion, the compressed data output from DRAMs IC013 and IC014 is input to JPEG coder IC003 by the DMA data transfer.
  The control signals (EOS (34), DSYNC (37), and STOP (33)) required for the JPEG coder are produced by a frame memory controller (IC401 on the FM-63 board).

- Card control block (IC002)
  The control pulses (CA0-CA10, CWE (11), COE (10), CCE1 (8), and CCE2 (9)) for inputting and outputting data to a card are produced by a peripheral device control circuit (IC002). The input/output data or control pulses are converted in voltage level for input and output according to the supply voltage (5 V or 3.3 V) of the PC card used.

- Real-time clock block (IC005)
  The real-time clock circuit IC005 sets and acquires the clock information via serial communication (CE (5), DATA (6), and CLK (7) signals of IC005) by main microcomputer IC001.
  The internal power supply of a circuit is switched to the backup battery (BAT981 on the IO-177 board) to store the internal data by the output signal of reset circuit IC008 when the power is turned off.
  The TIRQ (10) signal of IC005 is also used as a wake-up signal that is sent to the key/LCD microcomputer (IC501 on the KC-47 board).

- Serial communication block (IC010)
  IC010 is an RS-232C driver. IC010 is connected with the two-channel serial ports (RXD0 and TXD0, and RXD1 and TXD1) of main microcomputer IC001 for servicing or debugging. The resulting data is output to connector CN705 on the IF-717 board.

4-7. FUNCTION DESCRIPTION OF IF-717 BOARD

The IF-717 board mounts a back lighting circuit on the 2.5-inch liquid-crystal display (LCD) panel of a DSC-D700 digital still camera, a drive timing pulse generator circuit for liquid-crystal display (LCD), a video RGB decoder block, and an LCD driver circuit.
The IF-717 board consists of a video circuit block that outputs the composite video signal of a camera and a D/A converter block that adjusts and controls the video circuit block.
The IF-717 board has a PC card connector in which the PCMCIA-based PC card (type II) used as the recording media of a camera can be installed. Moreover, this board partially has a block that produces the power for driving a liquid-crystal display (LCD) circuit, or an RS-232C connector and board adjusting value detection pin for adjusting each board automatically.
Therefore, adjust the IF-717 board by the specially prescribed method after board mounting when it was replaced. (Refer to section 3 ELECTRICAL ALIGNMENT)

The function of the IF-717 board is concretely described below.
An UNREG2 power is supplied to the IF-717 board as the power that turns on the back light, and LCD 3 V, 4.5 V, and 15 V are supplied to the IF-717 board for a 2.5-inch liquid-crystal display (LCD) circuit. Next, 5 V (A) analog and 5 V (D) digital are sent to the IF-717 board as the D/A converter power used for each analog adjustment.
LCD 3 V, 4.5 V, and 15 V control the D/A converter potential by the system board so that the power supplied to this board can be turned on and off by pressing the button that turns on and off the LCD display of this unit. A power of 12 V for RGB decoder IC702 is produced from LCD 15 V by IC703.

The operation of a back lighting circuit is described next.
A back light unit is connected to connector CN707 on the IF-717 board via the flexible board and a lighting voltage is supplied from this connector. Notice that the generated voltage is approximately 250 VAC.
The back lighting circuit raises the DC voltage, which was regulated and controlled to a voltage of approximately 5 VDC by IC701, to approximately 250 VAC through combination of inverter transformer T701 and Q713.
IC701 is a switching regulator controller. The UNREG2 power supplied to Q712 through L710 is regulated to approximately 5 V by IC701 and sent to T701.
IC701 can set a PWM driving frequency according to the resistance value connected to pin 7. IC701 can also set so that the PWM driving pulse corresponding to the feedback voltage input to pin 4 can be obtained from pin 1. Even if the UNREG voltage fluctuates, stable brightness is obtained using the back light voltage set to approximately 5 V by the signal driving.

A low-temperature polysilicon type of 180,000 pixels is used for the 2.5-inch liquid-crystal display panel of this time so as to display a clear picture with horizontal resolution of more than 400 lines. This liquid-crystal display panel and IF-717 board are connected through the flexible board by connector CN708. A drive signal for the liquid-crystal display is produced by IC702 CXA2543R.
IC702 is a drive circuit exclusively used for color liquid-crystal display panel DCX501. In IC702, the RGB decoder function of a video signal, a drive function, and a panel drive timing pulse generator are put in one chip to reduce the number of parts and circuits required for driving the liquid-crystal display panel. Moreover, each mode setting or adjustment is directly controlled from the system microcomputer using an internal serial interface circuit and electronic volume.
Major functions are described below.

1. Internal drive circuit for color liquid-crystal display panel DCX501
2. NTSC/PAL system compatible
3. Y/C input compatible
4. Internal serial interface circuit
5. Internal electronic volume (D/A converter)
6. Internal BPF, TRAP, and DL
7. Internal sharpness function
8. Internal two-point gamma correction circuit

Crystal oscillator X701 connected to pins 56 and 57 of IC702 generates a subcarrier frequency. A crystal oscillator of 3.58 MHz is mounted for NTSC, and a crystal oscillator of 4.43 MHz is mounted for PAL.
The trap frequency of a chroma signal is formed at pin 1 of IC702. The frequency is changed for NTSC and PAL by connecting LC to the outside.
A system clock of IC702 is generated and input at pins 14 and 15 of IC702. The input video sync signal is synchronized using an internal PLL circuit. A PLL circuit is adjusted by controlling the potential of a D/A converter.
A chroma signal is input through Q725 to pin 59 of IC702 and a video Y signal (described later) is input to pins 3 and 61 of IC702. At that time, a picture appears on the liquid-crystal display panel.
Pins 33 to 35 of IC702 are used as the serial interface of IC702. Pin 33 to 35 are connected to the system controller board via connector CN701 and used to set the operating mode or adjustment value of IC702.

IC707 is a 10-channel D/A converter. Pins 14 to 17 of IC707 are used as a serial interface. Pins 14 to 17 are connected to the system controller board via connector CN701. A D/A output signal is changed from the system controller by communication data to control the adjustment or on/off operation of each circuit.

The main items to be adjusted are a Y signal, a chroma signal level value, SIG CET, BLNK, LIM, and PICTURE of a liquid-crystal display panel drive signal, a COM voltage, and a PSIG signal. A PLL circuit is adjusted from this D/A converter. (Refer to section 3 ELECTRICAL ALIGNMENT)

Q729, Q730, Q738, and Q739 receive the Y, C, and sync signals produced on the FM board from connector CN701. In this block, the Y and sync signals are mixed to the proper value in a resistance ratio and sent to the later stage of a video circuit.
F702 is a low-pass filter (LPF). F702 is used to produce the band-limited Y signal. A cut-off frequency is set to 5.5 MHz.
F703 is a bandpass filter (BPF) for the chroma (C) signal. The band is set to 3.58 MHz or 4.43 MHz according to the NTSC or PAL system.
IC705 has a VCA function. The adjustment width in two channels is controlled ±3 dB according to the external potential and adjusted so that it reaches the prescribed signal level. Each signal output from IC705 is grounded at the emitters of Q732 and Q733. The signal halved in this block is sent as a video signal for driving the liquid-crystal display panel described previously.
Y and C signals are mixed by Q734, and the composite video signal driven using 75 Ω driving circuit IC706 is output from video jack J701 to the outside of a camera. The power of IC706 has been designed to be turned off by Q737 when it is not connected to video jack J701 for ensuring the energy saving of the camera.

Connector CN703 is a 68-pin PC card connector. A memory stick is inserted into CN703 through the PCMCIA-based flash memory card or adaptor that is used as the recording media of a camera. This connector is mounted on the IF-717 board. The PC card is connected to a system controller through connector CN701.
The PC card including the power is controlled in this case. The operation switch or power switch signal of a camera is sent to connectors CN706 and CN704.

Board-to-board connector CN705 is a connection pin used for checking or adjusting each board of this camera. The signal from two microcomputer communication lines based on RS-232C specifications and the signal at the adjustment point during adjustment on the IF-717 board are output. These signals are observed to make adjustment.

4-8. FUNCTION DESCRIPTION OF KC-47 BOARD

Functional outline of KC-47 board

- The main function of the KC-47 board is to read a key scan signal and infrared remote control signal by key/LCD microcomputer IC501 and control the LCD display on the LCD panel or in the finder. Key/LCD microcomputer IC501 exchanges data by the serial communication (SH REQ (7), KY REQ (6), SH SCK (4), SH DATA (4), and KY DATA (3)) with a main microcomputer (IC001 on the SY-264 board).

Function description of main blocks

- Key scan block (IC501)
  A key matrix is performed by signals KEY IN0 to IN5 (19 to 24) and KEY OUT0 to OUT5 (87, 88, and 91 to 94) of key/LCD microcomputer IC501. The key scan block detects the operation of all keys and switches including the “shift dial” and “mode dial” keys other than “power dial”.

- Infrared remote control signal detection block (IC501)
  The output signal from an infrared remote control photosensor (IC651 on the RM-177 board) is passed through the IF-717 board, inverted by Q506, and input to pin 29 (SIRCS) of key/LCD microcomputer IC501. Moreover, the input signal is noise-eliminated in IC501 and detected as a remote control signal.

- LCD control block (IC501)
  In key/LCD microcomputer IC501, 48 segments (SEG0 to SEG47) and four commons (COM0 to COM3) are provided as LCD driving output. These driving output signals are allocated for the LCD display on the LCD panel and in the finder so that they are controlled.

- Power management (IC501)
  An SHPWR signal is output from key/LCD microcomputer IC501 to DC-DC converter IC652 on the RM-177 board using the serial communication command from a main microcomputer (IC001 on the SY-264 board) so as to interrupt the power supply of the whole system. At that time, key/LCD microcomputer IC501 enables the wake-up interrupt operation to shift to the low-current consumption mode.

- Card IN/OUT detection (IC501 and IC502)
  The CD1 and CD2 signals input from a PC card are input through IC502 to pins 97 and 98 of key/LCD microcomputer IC501. The IN/OUT signal of the PC card is detected at that time.
  The supply voltage detection signals (VS1 and VS2) from a PC card are input to pins 25 and 26 of IC501, and the detected data is directly sent to a main microcomputer (IC001 on the SY-264 board) by serial communication.

- Supply voltage monitoring (IC501 and IC505)
  Key/LCD microcomputer IC501 controls the caution display during the decrease in a battery voltage or the power supply of the whole system during the power-on sequence using the output signal of voltage detection circuit IC505.

4-9. FUNCTION DESCRIPTION OF PS-536 BOARD

The PS-536 board is a DC/DC converter board that produces the power for the camera board of a DSC-D700 digital still camera.
A voltage is produced as the UNREG1 and UNREG3 voltages used on the camera circuit board.
The operating voltage is used as −8.5 V, 15 V, and circuit voltages supplied to CCD. CAM 3.3 V (analog), CAM 3.3 V (digital), or MTR 5 V is used as the lens driving power.
Moreover, the digital 3 V power of a 2.5-inch liquid-crystal display function and the 5 V power used on the system control board are also produced on the PS-536 board. These powers are turned on and off from the system control board using a PWRC (CAN) signal. Each power is not adjusted and controlled in the operating voltage range.

The concrete functional operation is described below.
IC601 (MB3785A) employs a 46-pin, SQFP-type IC package for the switching regulator controller operation. IC601 has a 4-channel internal controller. Using all functions, IC601 produces the voltage described above.

1. Switching regulator functions
   1) Reference voltage circuit
      The reference voltage circuit generates a temperature-compensated reference voltage (2.5 V) by the power supplied from the power pin (pin 18) and uses it as the internal operating power of IC. The reference voltage can also be sent out from pin 19 to the outside as a signal at the Vref pin.
   2) Chopping wave generator circuit
      This circuit generates an arbitrary chopping oscillation waveform by connecting a capacitor and resistor for timing to pins 17 and 16. The amplitude of this waveform is 1.3 to 1.9 V. The waveform is input to the PWM converter in IC to drive each channel.
   3) Error amplifier
      The error amplifier detects the output voltage of a switching regulator and outputs a PWM control signal. The in-phase input range is wide and the voltage can be set easily. Moreover, the gain and voltage can be freely set by connecting a feedback resistor and capacitor from the output pin of the error amplifier to the inverting input pin.
   4) PWM converter
      Channels 1 and 2 have two inverting input pins. The PWM converter is a voltage-to-pulse converter that controls the ON time of an output pulse according to the input voltage using a voltage comparator.
      Channels 3 and 4 have one inverting input pin. The PWM converter is a voltage-to-pulse converter that controls the ON time of an output pulse according to the input voltage using a voltage comparator.
      An output transistor is turned on while a chopping wave is lower in level than the output signal of an amplifier and the signal at the DCT pin. The maximum output current is 30 mA.

2. Channel control function
   This circuit can independently control a 4-channel power circuit. This time, the output signal of this circuit can be obtained when the voltage level is high with pins 20, 21, and 22 connected.

3. Protection functions
   1) Timer latch-type short protection circuit
      An SCP comparator detects each comparator output voltage level for output short-circuit detection. When at least one output voltage becomes more than 2.1 V, the timer circuit operates and the external capacitor at the SCP pin (pin 23) begins charging. A latch circuit operates when the output voltage described above is not restored to the normal voltage until this voltage rises to the Vbe voltage. After that, an output transistor is turned off, and simultaneously, the pause period is set to 100 %. The power can be turned on again for restoration when this protection circuit operates.
   2) Malfunction prevention circuit during low-voltage input
      The transient state during the power-on sequence or the instantaneous decrease in a supply voltage causes the malfunction of a control circuit, and damages or deteriorates the system. This function turns off an output transistor to prevent a malfunction by detecting the supply voltage level and resetting a latch circuit.

4. Transformer T601 outputs −8.5 V and 15 V of a camera in the winding ratio of a transformer because a circuit consists of parts on the PS-536 board.

5. Transistors Q605 to Q602 control and drive each power. They cover more than the output current of each power.

6. The voltage produced on the PS-536 board is sent from each pin of board-to-board connector CN602 to the unit.

7. As described in the attached paper, connector CN603 is a connector used when the 2.5-inch liquid-crystal display power and system control power that cannot be mounted on the PS-536 board because of the space or circuit scale are mounted on the RM-177 board.

8. An UNREG voltage is sent from the KC-47 board to the CN601 connector through a harness.

4-10. FUNCTION DESCRIPTION OF RM-177 BOARD

The RM-177 board is a DC/DC converter board that produces the power for the system board and 2.5-inch liquid-crystal display board of a DSC-D700 digital still camera. The RM-177 board also mounts the photosensor of an infrared unit.
A voltage is produced as the UNREG2 voltage used on the system control circuit board and liquid-crystal display board.
The operating voltage is used as −7.5 V, 15 V and 4.5 V for liquid-crystal display. These voltages are used as the driving power.
These powers are turned on and off from the system control board using a PWRC (SY) signal. Each power is not adjusted and controlled in the operating voltage range.

The concrete functional operation is described below.
IC652 (MB3785A) employs a 46-pin, SQFP-type IC package for the switching regulator controller operation. IC652 has a 4-channel internal controller. Using all functions, IC652 produces the voltage described above.

1. Switching regulator functions
   1) Reference voltage circuit
      The reference voltage circuit generates a temperature-compensated reference voltage (2.5 V) by the power supplied from the power pin (pin 18) and uses it as the internal operating power of IC. The reference voltage can also be sent out from pin 19 to the outside as a signal at the Vref pin.
   2) Chopping wave generator circuit
      This circuit generates an arbitrary chopping oscillation waveform by connecting a capacitor and resistor for timing to pins 17 and 16. The amplitude of this waveform is 1.3 to 1.9 V. The waveform is input to the PWM converter in IC to drive each channel.
   3) Error amplifier
      The error amplifier detects the output voltage of a switching regulator and outputs a PWM control signal. The in-phase input range is wide and the voltage can be set easily. Moreover, the gain and voltage can be freely set by connecting a feedback resistor and capacitor from the output pin of the error amplifier to the inverting input pin.
   4) PWM converter
      Channels 1 and 2 have two inverting input pins. The PWM converter is a voltage-to-pulse converter that controls the ON time of an output pulse according to the input voltage using a voltage comparator.
      Channels 3 and 4 have one inverting input pin. The PWM converter is a voltage-to-pulse converter that controls the ON time of an output pulse according to the input voltage using a voltage comparator.
      An output transistor is turned on while a chopping wave is lower in level than the output signal of an amplifier and the signal at the DCT pin. The maximum output current is 30 mA.

2. Channel control function
   This circuit can independently control a 4-channel power circuit. This time, the output signal of this circuit can be obtained when the voltage level is high with pins 20, 21, and 22 connected.

3. Protection functions
   1) Timer latch-type short protection circuit
      An SCP comparator detects each comparator output voltage level for output short-circuit detection. When at least one output voltage becomes more than 2.1 V, the timer circuit operates and the external capacitor at the SCP pin (pin 23) begins charging. A latch circuit operates when the output voltage described above is not restored to the normal voltage until this voltage rises to the Vbe voltage. After that, an output transistor is turned off, and simultaneously, the pause period is set to 100 %. The power can be turned on again for restoration when this protection circuit operates.
   2) Malfunction prevention circuit during low-voltage input
      The transient state during the power-on sequence or the instantaneous decrease in a supply voltage causes the malfunction of a control circuit, and damages or deteriorates the system. This function turns off an output transistor to prevent a malfunction by detecting the supply voltage level and resetting a latch circuit.

4. Transformer T651 outputs −7.5 V of a system control block and 15 V of LCD in the winding ratio of a transformer because a circuit consists of parts on the RM-177 board.

5. Transistor Q654 controls and drives the power. It covers more than the output current of each power.

6. An UNREG2 voltage is sent from connector CN652 to the RM-177 board. The voltage produced on the RM-177 board is sent from each pin of connector CN652 to the unit through the PS-536 board.

7. As described in the attached paper, connector CN651 mounts the parts that sense the infrared command signal sent to the KC-47 board. In other words, the power is supplied from pin 4 of IC651 and an infrared command is output from pin 1. Pins 5 and 6 of connector CN652 corresponds to the WB hold switch.

8. A signal that drives the self-timer LED mounted on the RM-177 board is input to pin 4 of connector CN652.

9. Pins 7 to 15 of connector CN651 are used as the interface for sending the control signal of a stroboscopic unit from the KC-47 board to the camera board through CN653.

The internal flash unit of this time is electrically constituted in the upper cabinet of a camera and connected to the CA-31 board through the KC-47 and RM-177 boards. The internal flash is charged when the STRB CHG signal at pin 7 of connector CN651 is set high. The internal flash emits light when the STRB TRG signal at pin 9 of CN651 becomes active in a low level.

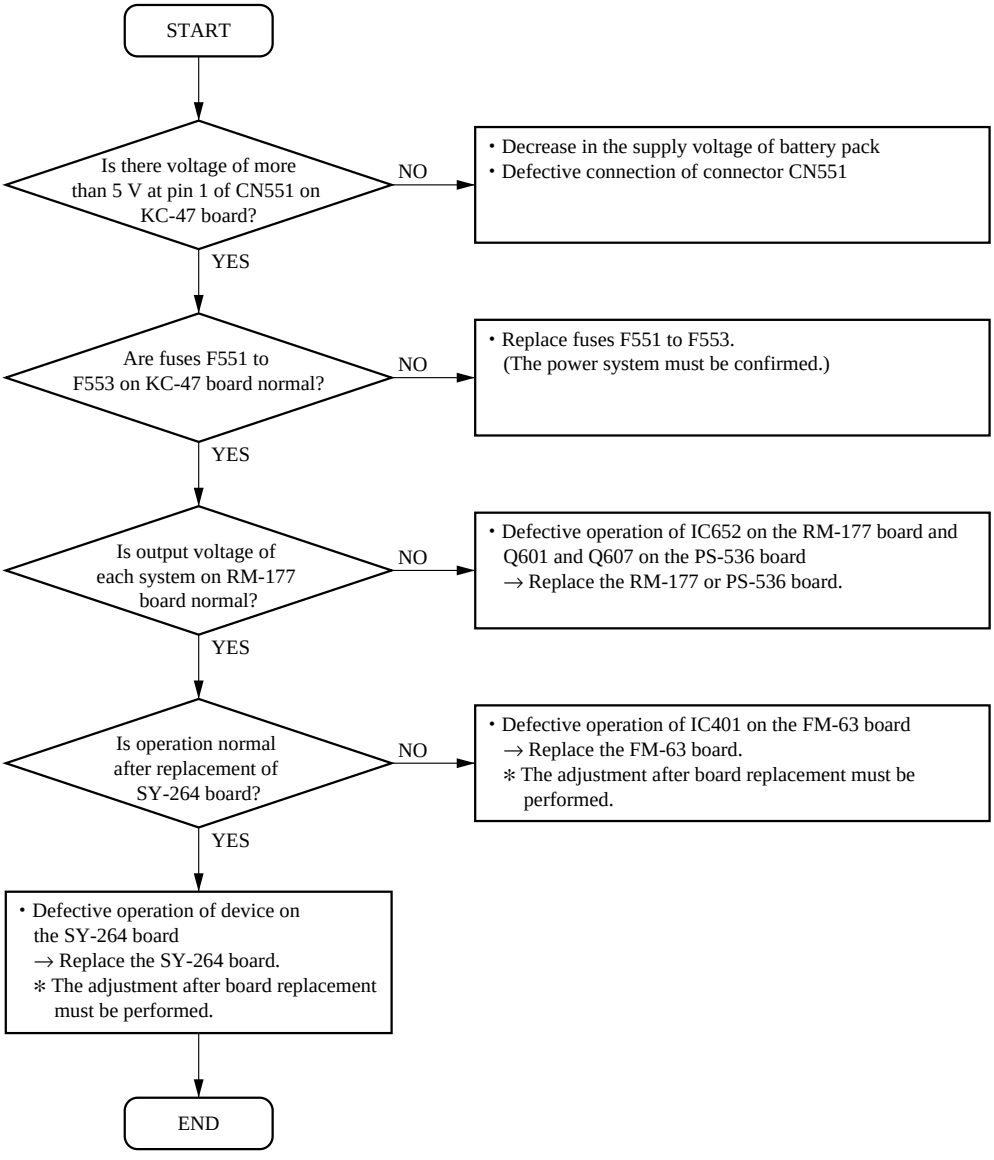
When the camera ISO sensitivity at pins 10 and 11 of CN651 is switched, the adjusted light level can be changed to stabilize the exposure according to the information after the internal flash emits light.

The STRB PWR signal at pin 12 of CN651 controls the main power of the internal flash. It is kept high as required. The signal at pin 13 of CN651 is a light-emitting signal of external flash. Light is emitted when the signal becomes active in a high level.

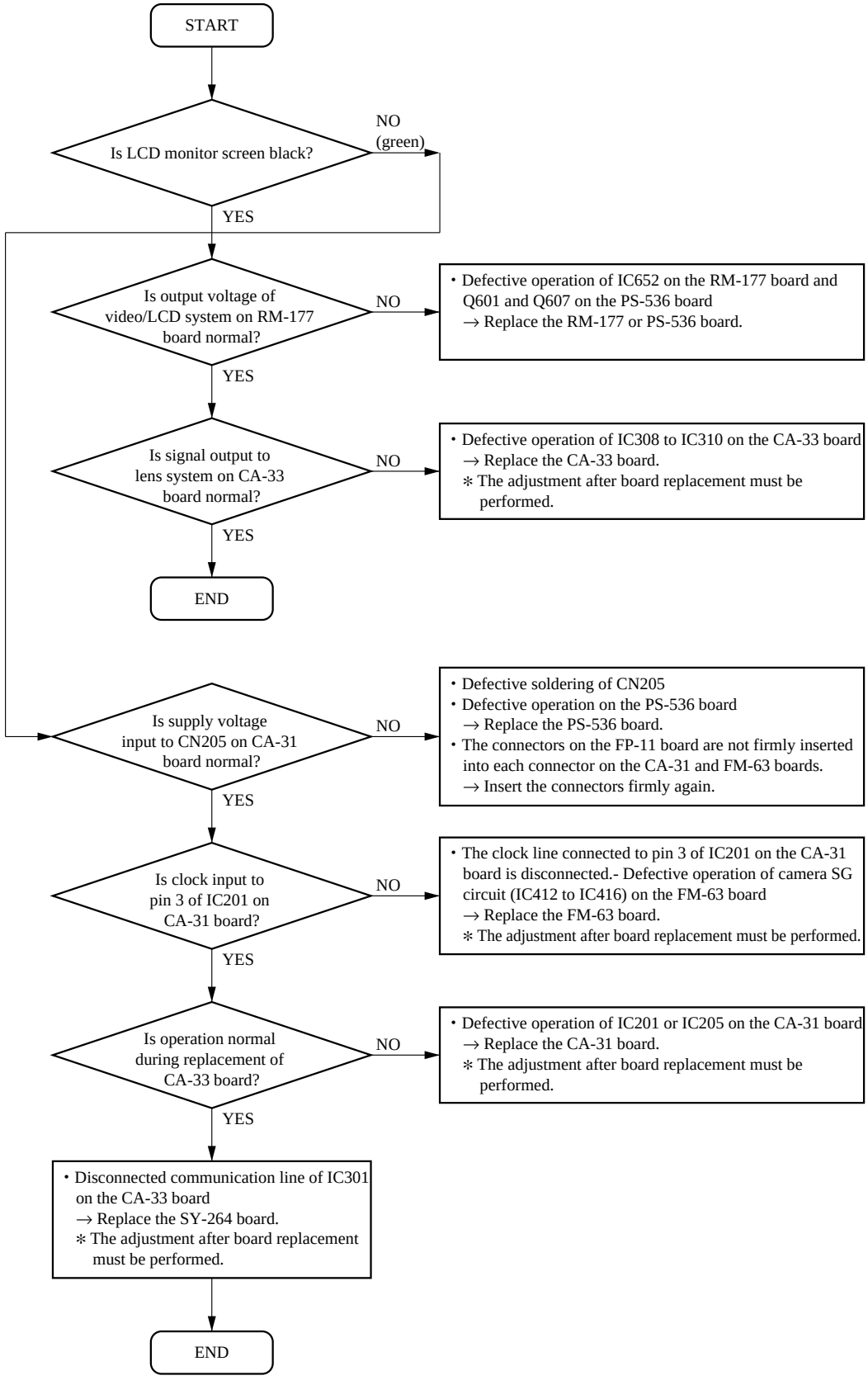
The internal flash unit of this time is mounted in the upper cabinet of a camera as described above. Therefore, replace the whole upper cabinet of a camera for repair when a failure occurs in this block. During replacement, a high voltage may be charged on a flash capacitor. Be careful not to receive an electric shock.

4-11. TROUBLESHOOTING

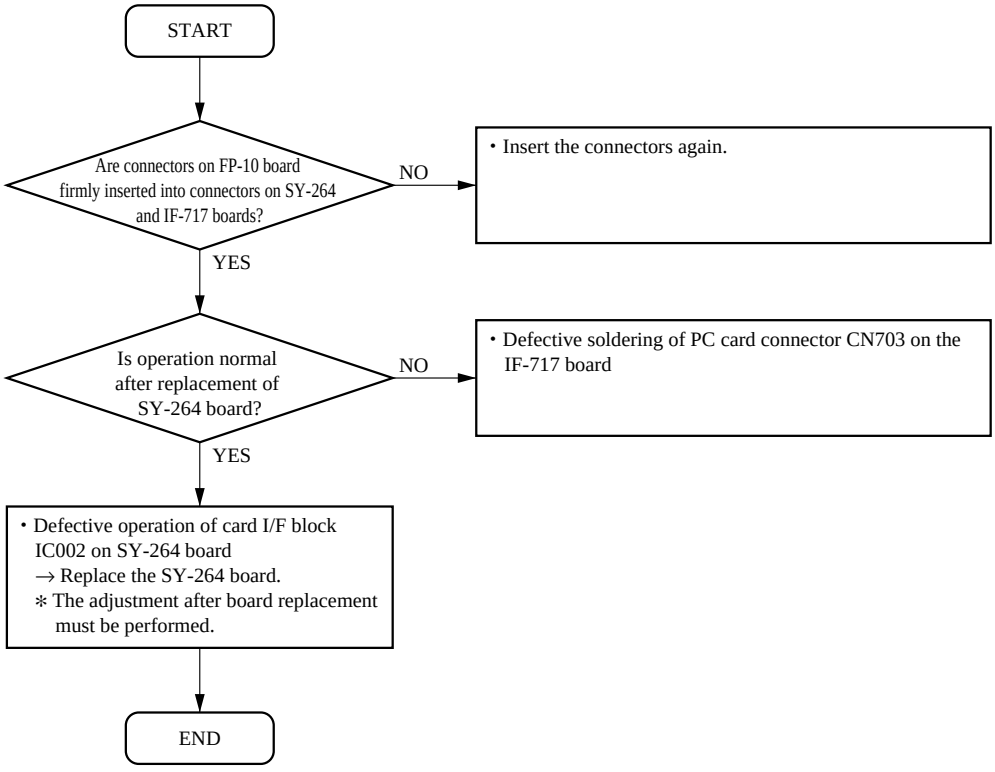
1. When no power is turned on
   (No display appears on the LCD panel.)


START
Is there voltage of more than 5 V at pin 1 of CN551 on KC-47 board?
NO
• Decrease in the supply voltage of battery pack
• Defective connection of connector CN551
YES
Are fuses F551 to F553 on KC-47 board normal?
NO
• Replace fuses F551 to F553.
(The power system must be confirmed.)
YES
Is output voltage of each system on RM-177 board normal?
NO
• Defective operation of IC652 on the RM-177 board and Q601 and Q607 on the PS-536 board
→ Replace the RM-177 or PS-536 board.
YES
Is operation normal after replacement of SY-264 board?
NO
• Defective operation of IC401 on the FM-63 board
→ Replace the FM-63 board.
∗ The adjustment after board replacement must be performed.
YES
• Defective operation of device on the SY-264 board
→ Replace the SY-264 board.
∗ The adjustment after board replacement must be performed.
END

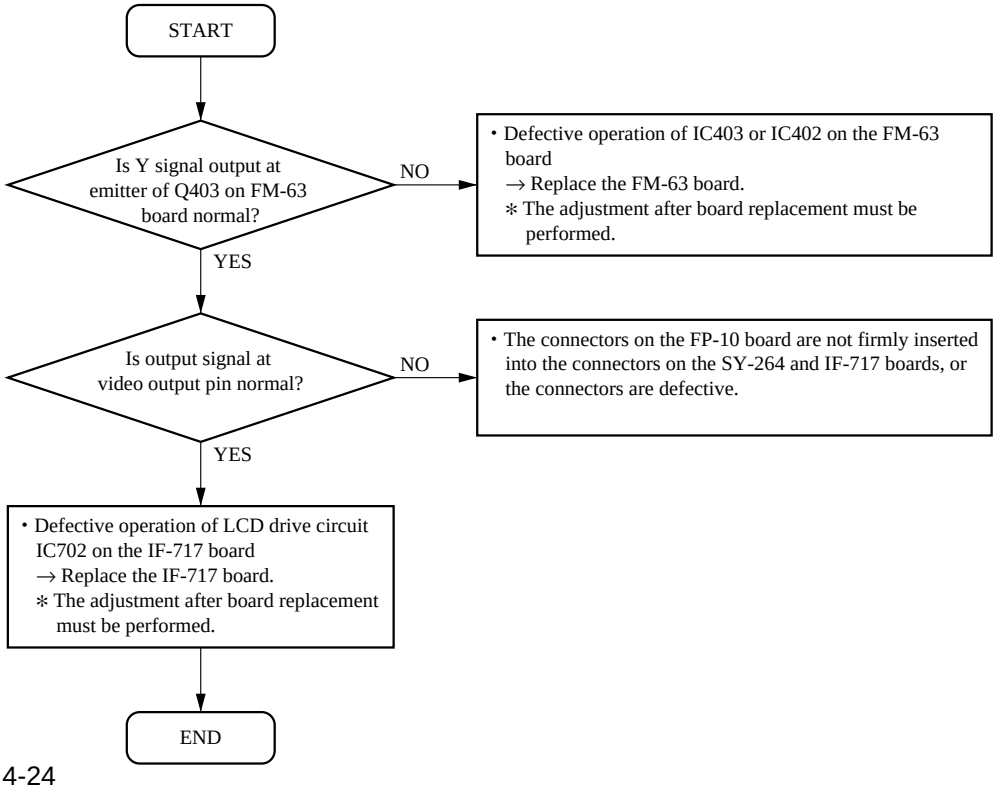
2. When the EE picture of a camera is not displayed on the LCD monitor in the CAM mode
   (The recorded picture of a PC card is normally reproduced in the PLAY mode.)


START
Is LCD monitor screen black?
NO (green)
YES
Is output voltage of video/LCD system on RM-177 board normal?
NO
・Defective operation of IC652 on the RM-177 board and Q601 and Q607 on the PS-536 board
→ Replace the RM-177 or PS-536 board.
YES
Is signal output to lens system on CA-33 board normal?
NO
・Defective operation of IC308 to IC310 on the CA-33 board
→ Replace the CA-33 board.
∗ The adjustment after board replacement must be performed.
YES
END
Is supply voltage input to CN205 on CA-31 board normal?
NO
・Defective soldering of CN205
・Defective operation on the PS-536 board
→ Replace the PS-536 board.
・The connectors on the FP-11 board are not firmly inserted into each connector on the CA-31 and FM-63 boards.
→ Insert the connectors firmly again.
YES
Is clock input to pin 3 of IC201 on CA-31 board?
NO
・The clock line connected to pin 3 of IC201 on the CA-31 board is disconnected.- Defective operation of camera SG circuit (IC412 to IC416) on the FM-63 board
→ Replace the FM-63 board.
∗ The adjustment after board replacement must be performed.
YES
Is operation normal during replacement of CA-33 board?
NO
・Defective operation of IC201 or IC205 on the CA-31 board
→ Replace the CA-31 board.
∗ The adjustment after board replacement must be performed.
YES
・Disconnected communication line of IC301 on the CA-33 board
→ Replace the SY-264 board.
∗ The adjustment after board replacement must be performed.
END

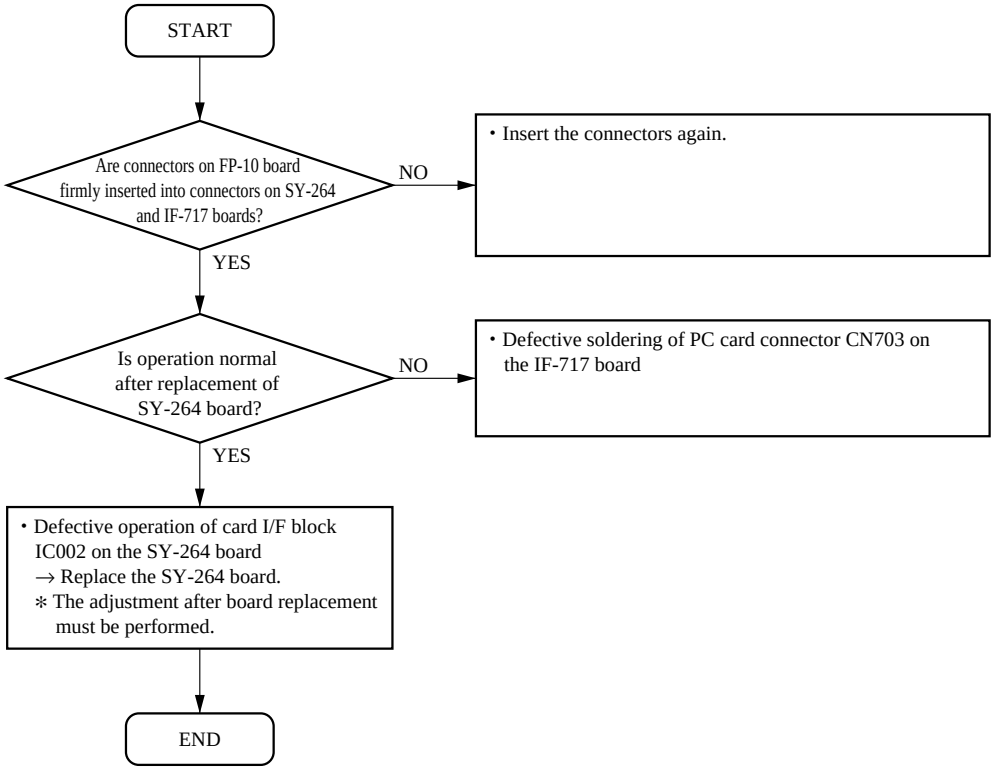
3. When the recorded picture of a PC card is not reproduced on the LCD monitor in the PLAY mode
   (The EE picture of a camera is normal in the CAM mode.)


START
Are connectors on FP-10 board firmly inserted into connectors on SY-264 and IF-717 boards?
NO
・Insert the connectors again.
YES
Is operation normal after replacement of SY-264 board?
NO
・Defective soldering of PC card connector CN703 on the IF-717 board
YES
・Defective operation of card I/F block IC002 on SY-264 board
→ Replace the SY-264 board.
∗ The adjustment after board replacement must be performed.
END

4. When the recorded picture of a PC card is not reproduced on the LCD monitor in the PLAY mode
   (The EE picture of a camera is also not displayed in the CAM mode.)


START
Is Y signal output at emitter of Q403 on FM-63 board normal?
NO
・Defective operation of IC403 or IC402 on the FM-63 board
→ Replace the FM-63 board.
∗ The adjustment after board replacement must be performed.
YES
Is output signal at video output pin normal?
NO
・The connectors on the FP-10 board are not firmly inserted into the connectors on the SY-264 and IF-717 boards, or the connectors are defective.
YES
・Defective operation of LCD drive circuit IC702 on the IF-717 board
→ Replace the IF-717 board.
∗ The adjustment after board replacement must be performed.
END

5. When no picture can be recorded on a PC card in the CAM mode
(The EE picture of a camera is normal.)


START
Are connectors on FP-10 board firmly inserted into connectors on SY-264 and IF-717 boards?
NO
• Insert the connectors again.
YES
Is operation normal after replacement of SY-264 board?
NO
• Defective soldering of PC card connector CN703 on the IF-717 board
YES
• Defective operation of card I/F block IC002 on the SY-264 board
→ Replace the SY-264 board.
✻ The adjustment after board replacement must be performed.
END

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